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The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Oil from Africa

AMONG the measures taken by the present Government, few have more theoretical justification than that of growing groundnuts on 3 million acres of tsetse-infested bush in Tanganyika. At a time when the world is short of food, it has been widely agreed in these columns and elsewhere in recent weeks that a project to turn this vast area of fertile Africa into an agricultural estate to provide much-needed oils appeared to be a master stroke. It is a thousand pities that the project now seems to have been carried out without due thought and plan, leading both in this country and in Africa to a general sense of disquiet and apprehension.

The seriousness of this is magnified by the activity now being shown by the Colonial Development Corporation, under the chairmanship of Lord Trefgarne, and the knowledge that upon the efficiency of its schemes in the practical sphere depends the fate of potentially a great increment of the raw materials of chemical industry. Very large sums of public money also are involved. Before 1950 ends, this corporation expects to spend not less than £20 million on some 20 or 30 Colonial projects unrelated to the Tanganyika scheme—in addition to the heavy annual expenditure for which the Colonial Development and Welfare Act provides. One of these projects also is concerned with groundnut cultivation, on the African Gold Coast, and calls for the expenditure of £1 million at once and probably of £20 million more in the next few years.

Ostensibly, the magnitude of what is being planned in these various locations should make certain an addition to our vegetable oil supplies large enough to free us to an appreciable degree from the thrall of monopolists outside the Commonwealth. Lamentably—judging by what has been reported from Tanganyika—there seems to be no certainty of that, nor yet much assurance that the millions sterling being made available will yield an adequate return in kind in reasonably short time. The danger arises very largely from the fact that politicians concerned with these schemes seem incapable of realising that in industrial matters it is not enough to wave a hand, as when addressing a non-technical audience, but that scientific facts must be placated or they will destroy you.

The Tanganyika scheme has already been voted £25 million by Parliament. It does not seem that this amount will be anything like sufficient. The costs of land reclamation and of developing the land so reclaimed are far greater than had been estimated. Moreover, the £25 million does not include the new roads, railways and harbours that are necessary if so large an area as 3 million acres is to be developed. The initial cost of the project is threatening to be out of proportion to any advantage that will accrue to this country.

Little, if any, of this criticism can fairly be directed at the men on the spot. From all accounts they have done a good job of work in clearing the first 7500 acres, under many unforeseen difficulties, and in

On Other Pages

Leader :		<i>Activated Carbon from Coal</i>	79
<i>Oil from Africa</i>	69	<i>Oils and Fats in S.E. Asia</i>	82
Notes and Comments :		<i>An Engineering Odyssey</i>	83
<i>SCI in Edinburgh</i>	71	<i>German Wood Chemistry</i>	84
<i>Atomic Deadlock</i>	71	<i>French Hydrogenation and Frac-</i>	
<i>Verdict on a State Industry</i>	71	<i>tionation</i>	85
<i>A Technical Win</i>	72	<i>New Canadian Industries</i>	86
<i>Realities or Theories?</i>	72	<i>Work on Arsenic Insecticides</i>	87
<i>More Invisible Exports</i>	73	<i>Trade with Turkey : More Scope for</i>	
<i>U.S. Factories in Europe</i>	73	<i>Pharmaceuticals</i>	88
<i>Effective Oil Research</i>	74	<i>Nitrogen, Sulphur and Peroxide</i>	89
<i>Power Cuts Next Winter</i>	74	<i>American Chemical Notebook</i>	90
<i>Athole G. Allen Sells Plant</i>	74	<i>A Model Research Centre</i>	91
<i>Basic Chemicals in April and May</i>	75	<i>A Chemist's Bookshelf</i>	92
<i>Fire Protection in Laboratories</i>	76	<i>Technical Publications</i>	93
<i>Non-Ferrous Metals Federation</i>	77	<i>Parliamentary Topics</i>	95
<i>Re-opening the Metal Exchange</i>	78	<i>New Rayon Research Centre</i>	100

planting that area with nuts. It is the basic planning of the scheme that is at fault, and has resulted in the initial cost being so greatly under-estimated.

Even a Government that cheerfully allows a nationalised coal industry in Britain to lose more than £20 million in a year must think deeply before embarking on an expenditure in equatorial Africa that is certain to be a good deal greater than £25 million.

The Government, committed to nationalisation and to huge State Corporations, has carried that principle into the ground-nut scheme. It has discarded the United Africa Company, a private concern with immense experience in plantation management, in favour of a State-run corporation, regardless of the fact that such a body is most ill-adapted to run successfully three vast estates totalling 3 million acres and separated by hundreds of miles. Lord de la Warr, who has lately visited the territory, has returned to advocate the adoption of much smaller holdings of about 5000 acres that can be farmed with mechanised plant let on long lease to approved individuals who would be risking their own money.

It must not be forgotten that it will be impossible to grow the one crop only; that

way lies soil erosion and in the end another dust bowl with the desert spreading over all. Crop rotation is essential and is in fact foreseen by experimental work now in progress at Kongwa. That means that nothing like the full yield of oil will be secured from 3 million acres. A great deal of food will be grown that will never leave Africa; it will be used in raising the standard of living of the natives. That is wholly admirable. But can we afford it just now?

Italian Chemical Council

PROGRESS in development of UNICHIM, the newly formed organisation intended to secure closer collaboration of all chemical organisations and individual undertakings, is reported from Italy. Among its objectives are "to co-operate with all chemical organisations of Italy, and of other countries and to participate eventually in any initiatives favouring chemical industry in any manner." The number of votes allotted to a member will depend upon the size of his financial contribution. The first council of the new institution is as follows: President, Dr. Luigi Sessa; members: Dr. C. Bagno (Italgas), Dr. R. Frisacò (Montecatini), Mr. E. G. Salice (Rumianca), Dr. G. Marzi (Cifaro), Dr. G. Tremi (Solvay), and Prof. G. Pastonesi (A.N.I.C.).

NOTES AND COMMENTS

SCI in Edinburgh

FAVOURED with the prospect of hearing original papers by acknowledged experts, the unusually large following which the 67th annual meeting of the Society of Chemical Industry drew to Edinburgh at the beginning of this week has had an unassailable alibi for flying from the rigours of July in England. While conditions in North Britain have been something less than tropical, there seems to have been general agreement that the move to the north was a prudent one, particularly in the interest of the varied programme of social occasions, which is not the least important part of the annual meeting. One of the most warming of the non-scientific proceedings was the presentation at the annual general meeting on Wednesday of a ceremonial gavel, sounding board and casket, as a token of the affectionate regard in which the society is held by one of its many distinguished members overseas. The donor, Dr. Wallace P. Cohoe, New York consulting chemist and former president of the society, was also the fabricator, using as material a charred beam from London's blitzed Guildhall, shipped to him by the retiring president, Dr. L. H. Lampitt.

Atomic Deadlock

THE inability to see any immediate means of bringing about a peaceful and permanent cure of the atomic bomb neurosis is a failing not confined to the great uninformed. The Atomic Scientists' Association, which has devoted closer attention to this problem than have most of us, seems to be no more capable of foreseeing a happy ending—or of averting the possibility of an explosive one. This is evident in the official statement of the views of the council of the association, which has just been circulated, in which the lamentable descent, since the association began in 1946, from comparative confidence that sanity would prevail to the hope in 1948 that the worst may still not happen. After giving a well-balanced review of the steps which have been taken to secure peaceful agreement between the nations and of the psychological impediments on which each has stumbled, the

council "sees no hope of an early agreement . . . and believes that the solution can now be sought only through the constant promotion of all measures designed to make war less likely and to reach a settlement between the East and West."

The association also affirms its disbelief that the use of the bomb could bring a permanent solution tolerable to the peoples of the West nor yet confer immediate victory to any side. On that point the report is concerned almost entirely with negative results. The only positive contribution is its own, a reaffirmation of its unwavering belief in the virtue of collaboration between scientists of all nations, and in particular of the importance of maintaining and improving contacts between scientists of Eastern Europe and those of America and the West. Could it have thrown any light on how friendly collaboration with the East might be achieved this would have been a hopeful document—which it is not.

Verdict on a State Industry

THE propensity of nationalised industries for operating at a loss is a phenomenon not peculiar to this country, although the discouraging confirmation that the United Kingdom's expensive and not over-productive collieries have incurred a loss of more than £20 million in 1947 is giving us an uncomfortably intimate demonstration of the fact. Whatever is achieved in Russia is so shrouded in official secrecy and propaganda that the average Soviet citizen appears to be as much in the dark as we are; in Turkey, however, where much of the minerals are disposed by the State, facts and figures are still available. The comprehensive report lately issued by the Export Promotion Department of the Board of Trade is proof of that and it casts a revealing light on the operations of the State-owned mining organisation, the Eti Bank, which controls, among others, coal, copper, iron, gold and silver. It is true to say that almost every one of these State mineral activities is in a moribund condition because of its inability to produce materials, many of which are in urgent demand around the world, at an acceptable price. There are, of course, special difficulties associated with

the mountainous Turkish terrain and the interruption of activity in accustomed commercial channels caused by the war. But the Board of Trade survey seems to be in no kind of doubt where the main impediment lies. It makes perfectly clear that in its opinion until private enterprise is permitted to compete with the Eti Bank operating costs will continue too high to permit Turkey's mineral products to compete in world markets. It is tempting to speculate what would be the verdict were the Board of Trade to make a similarly disinterested survey of some nationalised industries nearer home.

A Technical Win

AMERICAN industry, more lavishly armed with patent processes and research institutions than any other, figures now as a giant of technology. It is the more refreshing to hear there are chinks in the giant's armour. Sir Graham Cunningham, describing to THE CHEMICAL AGE on his return from the U.S.A. what he observed in a far-ranging inspection of transatlantic scientific glassware, indicated several directions in which the best practice here is more advanced. As chairman of Triplex Safety Glass and Quickfit and Quartz, he had reason for gratification in finding that some of the technical matters in which his own companies have gone far have no true counterpart over there. American makers of technical glassware have, for example, paid little attention to standardised and fully interchangeable components (so that any of a dozen stop-cocks in the same category will fit as well as another) and to the production, in glass, of heavy chemical piping and processing plant. It is gratifying, at least in the latter connection, because supplying this deficiency may usefully supplement our dollar supplies. The production and use of glass piping of conventional types is, of course, lavish, but America has not yet developed the technique of producing "tailor-made" glassware, designed, and sometimes made, by chemists for the special needs of chemists. We have in fact not very much to learn, it seems, from this particular section of the glass industry—unless it is the secret of producing at a rate which justifies payment to ordinary glass workers of \$1.5 an hour (about

7s. 6d.) . . . and of procuring all the raw materials required to support production on the vast scale they have attained.

Realities or Theories?

ATRENCANT reminder that underlying all the economic and sociological controversy of the ephemeral kind is a much more fundamental rift of opinion is conveyed in an article sponsored by the Society of Individualists and written by Sir Ernest Benn, whose presentation in the past of what can be conveniently dubbed "the case for capitalism" has been accepted round the world as the liveliest exposition that subject has received. In contrast with the optimistic utterances of political theorists, Sir Ernest Benn discusses our economic plight with realism. "Capitalism," he declares, "will not put things right to-morrow or next year, or even for a generation; it would start things in the right direction and no higher claim should be made for it. One might as well talk of 'trying' arithmetic, or of 'trying' morality, as of trying capitalism. There is in fact nothing to try for we know all about it; we have at our disposal every detail of 150 years of the state of economic liberty which has come to be known as capitalism. Starting with conditions very near to barbarism we achieved, in freedom, the highest standard of living ever known in any country at any time. . . . It is easy to turn the electric light on to the actions of our forebears who had nothing better than a paraffin lamp, but to do so is merely silly. They moved on from the paraffin lamp to the fishtail gas burner and nothing better could then be done." Maintaining that our choice between planned bondage or the freedom associated with a personal responsibility and action is a matter of ethics rather than economics, Sir Ernest poses this question: "Is man to continue as the image of his Maker, or can he be delivered out of a test tube in a government laboratory and kept going by atomic energy, generated to the order of UNO?" The doubter, he suggests, should read Aldous Huxley's "Brave New World."

British Tar Offices.—The administrative offices of the British Tar Confederation have been removed to 9 Harley Street, London W.1. (Telephone Langham 1778).

MORE INVISIBLE EXPORTS

New Methods of Surmounting Trade Barriers

THE increasing practice, particularly in the chemical and associated industries, of the international exchange of patents and the opening, by parent firms, of new factories in countries where import markets are beset by permit and currency difficulties, formed the basis of an address delivered by Mr. H. S. Sutherland (Shawinigan Chemicals, Ltd.) at the annual meeting of the Canadian Manufacturers' Association.

The speaker pointed out that, in common with other trades, the chemical industry was confronted with the same export problems concerning licences, high freight rates, currency regulations and tariff barriers, but in its high level of technical skill it possessed an asset which could easily be utilised to alleviate many of these difficulties. The licensing of patents abroad, if done with prudence and economic skill, could produce guaranteed revenues over a long period of years without seriously affecting the general export trade.

Necessary Safeguards

In arranging this "invisible export of technical skill," said Mr. Sutherland, several factors must be taken into consideration. The leasing or outright sale of patents into foreign hands must not be so indiscriminate as to completely jeopardise the existence of established markets, although a certain reduction in the volume of exports was only to be expected. The fees received from foreign licencees, should, however, compensate for actual export losses. Another point which needed careful attention was the possibility of technical efficiency, in the form of the patent, falling into non-revenue producing channels. This was a most undesirable situation because, in addition to financial loss incurred by the proprietor of the patent, the fruits of costly and laborious research could be wilfully withheld in order that other and probably less efficient processes could take precedence.

Branches Abroad

Another and equally satisfactory method of creating invisible exports, Mr. Sutherland considered, was to establish a branch factory in a foreign country. In this case technical processes were merely transferred from one country to another and financial returns came in the form of dividends.

An important advantage of this method lay in the fact that control was still administered by the parent company. There

were, however, several disadvantages to be considered. Large amounts of capital must be transferred and immediately became dependent upon the economic and political fortunes of the chosen country. In addition, there may be a severe drain on the research staff at headquarters with perhaps a corresponding drop in the efficiency level at the home factory.

Currency difficulties and taxation could also offset to a considerable degree the initial advantage gained by the transfer.

Foreign Partnership

The speaker outlined a third method of exporting technical "know-how." This was to link up with some competent foreign manufacturer to form an entirely new company. Very little, if any, capital needed to be contributed by the possessor of technical knowledge in this case. The patent royalties could be accounted as shares in the new organisation and the risks connected with the previous methods were somewhat modified.

The question may be asked, Mr. Sutherland concluded, whether, in view of the financial benefits resulting from the mere export of research knowledge, large laboratories could not take the place of chemical plants. The answer, of course, was that, while such laboratories laid the foundation of patent processes the latter were perfected only after years of trial and error in large-volume production.

U.S. FACTORIES IN EUROPE

MR. PAUL HOFFMAN, E.R.P. administrator, announced details last week-end of a plan whereby U.S. industrialists will be permitted to spend £75 million in establishing factories in Britain and other European countries. Mr. Hoffman described the scheme as "a substantial inducement to American capital to seek profitable employment abroad."

The scheme is authorised under the European aid programme and the U.S. Government will offer American firms a 14-year guarantee that their foreign currency earnings will be converted into dollars. Mr. Hoffman said he desired applications for such guarantees to be sent to him as quickly as possible, so that he could estimate the volume of investment and find out each country's reaction towards the entry of American capital. No guarantee of profits is provided.

Athole G. Allen Sells Plant

"A Lifetime's Work Chopped Up"

WHEN chemical plant and machinery at the works of Athole G. Allen (Stockton) Ltd., came "under the hammer" at a four-day sale held last week, Mr. A. G. Allen, chairman and managing director, said he would not be present because he did not wish to see "a lifetime's work chopped up."

Last February the firm announced that owing to uncertain supplies of raw materials and frustration and delay in the company's efforts to use a substitute, future production would be confined to ground barytes and the mining of barytes. That decision meant the immediate dismissal of 100 men.

Mr. Allen described last week's developments as "a step towards self-preservation."

Breach of Faith Alleged

Following the sale, Mr. A. G. Allen, managing director, alleged that the Ministry of Supply had divulged confidential information about chemical processes to other chemical firms. He alleged that there had been unfair competition resulting from the Ministry of Supply's disclosures of barium chloride processes, of which, he said, until two or three years ago, his firm was the only producer in this country. He alleged that if the Ministry had done its job as administrator, instead of discriminating in favour of trade organisations which Athole G. Allen had refused to join, the Stockton plant could have continued.

(The firm was started in 1928 on the site of the old Stockton Chemical Works, which had been derelict since the Great War.)

POWER CUTS NEXT WINTER

PLANs for the spreading of the electricity load next winter were announced last week by the Ministry of Labour. They seek to provide for a 20 per cent reduction in industrial demands during peak hours (8 a.m.-12 noon and 4-5.30 p.m.) throughout December, January and February.

In October, November and March, when the problem is less acute, arrangements will be worked out by the Regional Boards for Industry in the light of local circumstances in collaboration with the British Electricity Authority.

A report presented by the Electricity Subcommittee of the National Joint Advisory Council says that the estimated increase in generating capacity will not in itself afford any alleviation to the problem in the coming winter.

Effective Ore Research

May Lead to Higher Output

SUCCESSFUL application of methods of improving the sinter, a mixture of Lincolnshire and Northamptonshire iron-stone, were announced last week by the Appleby-Frodingham Company, Scunthorpe. The result of research by the firm's technical staff, the new process may produce a substantial increase in the company's steel output.

Local desposits of iron-stone contain only 20 per cent of ore and shortly before the war the company installed an elaborate preparation plant to improve the quality of blast-furnace materials. It is in this special plant that the firm's research workers conducted the experiments which led to the new process.

New Furnaces Unnecessary

Plans for the erection of two new furnaces have now been temporarily shelved because the company is confident that the expected production increase from existing plant will exceed the year's target.

By the end of the year more than £3 million will have been spent on new construction and replacements at the Appleby-Frodingham works as part of a £168 million development plan.

Present output has now reached an annual rate of 845,000 tons of steel and 795,000 tons of pig-iron.

Franco-German Chemicals

Countries Collaborate to Form New Company

AFRANCO-GERMAN company with an initial share capital of 500,000 deutsche marks, of which 70 per cent has been provided by French and the remainder by German interests, has recently been registered in Säckingen in the French zone of Germany under the title Chlorbetriebe A.G. The immediate object of the company is to take over the Rheinfelden-Baden works of the I.G. Farbenindustrie, which have been renamed, some 18 months ago, Electrochemical Works Rheinfelden. The Chlorbetriebe A.G. is said to have concluded a 30-year's lease agreement with the Allied custodian of the works.

Although the Rheinfelden works of the I.G. are the smallest I.G. unit in the French zone, it represents a very appreciable asset, having its own raw material in the form of salt deposits and being able to use hydro-electric power from the Rhine. Demand for the two main products of the Rheinfelden-Baden plant, chlorine and alkalis, is assured for a very considerable period.

BASIC CHEMICALS IN APRIL AND MAY

Steady Increase in Total Production

VERY substantial increases in production of several of the basic materials of chemical industry are recorded in the issue for June of the Central Statistical Office's *Monthly Digest of Statistics* (HMSO, 2s. 6d.). The returns relate in a few cases to the month of May; most of the available records, however, are concerned with April.

One of the most marked improvements was recorded in the figures for molasses production, the total in April for cane-derived molasses reaching 11,800 tons, substantially the largest result recorded in the past two years, during which average output has been approximately 2000 tons less. There was, however, a very heavy seasonal reduction—to 400 tons—in the total of beet molasses.

Increased Fertilisers

Production of all types of fertiliser maintained the fairly continuous increase which has been achieved since the beginning of 1947 and one or two categories showed largely improved totals in April. Superphosphate, for example, totalled 113,700 tons, compared with the general level, some 5000 tons higher than the average monthly return in the past two years. Compound fertilisers almost maintained the exceptionally high tonnage first reached in March, exceeding 185,000 tons. Sulphuric acid was produced (in May) on a somewhat smaller scale than during the first three months of

the year, but the total of 129,100 tons is more than 13,000 tons larger than in May, 1947. Consumption, as of most other basic materials, continued the steady increase which has been manifest since the end of the war.

Canadian Salt Production

Canada produced 56,756 tons of common salt in February compared with 54,381 the previous month and 59,845 tons in February, 1947, the Dominion Bureau of Statistics reports. Salt shipments in February totalled 54,083 tons compared with 55,975 tons in January and 42,715 tons in February last year, while imports were 5449 tons against 15,859 tons a year ago, and exports 561 tons compared with 157 tons.

Chemical Trade Golf

The Chemical Trade golf competition, held at Formby on July 2, attracted competitors from a large number of firms engaged in the chemical industry. The Sir John Brunner Challenge Cup was won by G. L. Whyte (handicap 12), who returned a net score of 71. For the sixth year in succession, E. C. Tweedle returned the best scratch score of 77. The Rayner Memorial Team Prize was won by the synthetic ammonia and nitrates team, with an average of 83.1. The afternoon foursomes competition was won by A. R. Legard and J. D. Frame.

PRODUCTION AND USE IN APRIL AND MAY

	April, 1948		Stocks	April, 1947		Stocks
	Production	Consumption		Production	Consumption	
Sulphuric acid	129.1†	140	57.3†	115.8†	115.0	66.4†
Sulphur	—	21.5†	80.1†	—	18.2†	79.2†
Pyrites	—	19.2†	73.0	—	16.9†	89.0†
Spent oxide	—	16.3†	167.5†	—	15.3†	145.1†
Molasses	12.2	27.9*	187.9	7.1	32.2*	133.5
Industrial alcohol (mil. bulk gal)	1.81	2.84	5.96	2.26	2.44	4.20
Superphosphate	113.7	142.5	39.0	91.3	136.6	107.0
Compound fertilisers	184.7	230.3	81.4	130.4	252.6	83.7
Agricultural lime	—	413.3	—	—	114.1	—
Ammonia†	—	6.06†	5.07	—	5.96†	3.80
Phosphate rock (agricult.)	—	85.1	157.6	—	70.7	112.7
Phosphate rock (indus.)	—	6.70	43.4	—	3.89	34.6
Virgin aluminium	2.62	14.3	—	2.40	12.6	—
Magnesium	0.14	0.17	—	0.23	0.30	—
Virgin copper	—	33.3	84.3	—	23.9	97.5
Virgin zinc	—	19.1	38.8	—	13.7	35.8
Refined lead	—	17.9	32.6	—	13.9	14.8
Tin	—	2.30	12.6	—	2.64	16.2
Zinc concentrates	—	13.5	70.0	—	13.5	86.0
Steel ingot and castings (including alloys)†	293†	—	—	244	—	—
Rubber:						
Waste collected	0.01	0.21	11.1	0.04	1.55	81.4
Reclaimed	0.48	0.49	3.87	0.42	0.45	4.96
Natural	—	4.08	140.3	—	6.78	131.9
Synthetic	—	0.05	2.05	—	0.06	2.90

* Distilling only.

† May.

‡ Weekly average.

FIRE PROTECTION IN LABORATORIES

Practical Views on Equipment and Design

METHODS of fire protection in scientific laboratories was one of the subjects which received close attention during the general discussion following the presentation of papers at the Royal Institute of Chemistry symposium on "Laboratory Layout and Construction" (THE CHEMICAL AGE, April 24). A summary has now been made of a number of very practical points raised by members.

When members urged that adequate fire services should be an important factor in laboratory layout, Dr. F. H. Milner, who had previously described the adaptation of a large house as a laboratory, gave his audience brief details of the fire control services installed in the building.

Fire Drill Essential

The house, Brockham Park, was served by a 2-in. fire main with hoses in glass-fronted boxes at strategic points. In addition, foam type extinguishers were placed in the corridors and methyl bromide type extinguishers fitted inside the laboratories. Each laboratory was also fitted with escape gear at the windows.

Another member, Mr. Wilson, commented on the need for providing ample fire extinguisher capacity, particularly under present-day conditions of overcrowding in laboratories. The carbon tetrachloride type of extinguisher, he observed, gave rise to unpleasant odours and the methyl bromide type produced toxic fumes; thus these two types of extinguisher were, in his opinion, unsuitable for laboratory use. Most insurance companies insisted on the provision of foam type extinguishers, but he did not consider these entirely satisfactory since they left a good deal of mess to be cleared up after the fire had been extinguished. His personal choice was the extinguisher using carbon dioxide gas.

Following Mr. Wilson's comments several speakers advocated regular fire drill in laboratories, and suggested that familiarity with the method of operating fire extinguishers should form part of the laboratory discipline.

Laboratory Design

Asked if there was a basement at Brockham Park, and what were his ideas on the best use of it, Dr. Milner said that the basement consisted of a number of cellars which were used as auxiliary stores. The boiler, compressed air and vacuum pumps were also housed in the basement.

This led another member, Mr. Hiall, to point out that the symposium had stressed the lack of architects acquainted with the needs of chemists. As a result, most chemists had to design their own laboratories, and since they were not necessarily experts in this field the results were not always satisfactory. He pleaded for more architects to specialise in laboratory design.

Replying to this point, Mr. Prior (author of a symposium paper on laboratory fittings and fixtures) pointed out that there are many types of laboratories, chemical, physical, medical, etc., and it would be impossible for any architect to be sufficiently versed in these sciences to be able to design satisfactory laboratories for them all. In his view it was better for the scientist to consult a specialist experienced in the fitting out of the particular laboratory required, and to consult with the architect to ensure that the design of the laboratory was satisfactory.

Artificial Quartz Crystals

Useful Result of G.P.O. Research

A NEW chemical process for the production of piezo-electric crystals which, in addition to its scientific value, may lead to a considerable saving in dollar expenditure, is being developed at the Post Office engineering research station at Dollis Hill.

It is hoped that quartz crystals, which are purchased mainly from South America and which have been used for many years for frequency control of radio transmissions, can be displaced by artificial piezo-electric crystals grown under laboratory conditions.

Used As Resonators

The modern technique for telephone transmission over long land-line routes is to concentrate a number of telephone conversations on a single pair of conductors, each conversation occupying a different point of the frequency spectrum, with separation controlled by quartz crystal resonators. Signal strength over long distances is maintained by using wide-band amplifiers every six miles, and thus equipped two co-axial cables can carry over 600 simultaneous conversations.

It is now hoped that the artificially grown piezo-electric crystals can be used in such multi-channel circuits for frequency control and separation.

NON-FERROUS METALS FEDERATION

President on Effects of State Control

BY the enlistment during the year of the Non-Electrical Copper Association, the number of metal trade firms within the British Non-Ferrous Metals Federation was raised to 74.

Announcing this at the annual general meeting of the federation in Birmingham last week, Mr. Horace W. Clarke, who was re-elected president for the third year, referred with deep regret to the loss the federation has recently sustained by the death of their first hon. treasurer, Mr. Lloyd Gibbins. They were fortunate in having secured the acceptance of Mr. A. L. Johnson, chairman of the High Conductivity Copper Association, to accept the vacant Office.

Dependent on the Government

Reviewing principal activities during the year, the chairman observed: "This industry is still dependent upon H.M. Government for its raw material and for its licences. It is, therefore, natural that relations with the Ministry of Supply should be one of the most important functions of the federation. The closest contact is maintained with the officials of the Ministry who are responsible for our destinies. Regular monthly meetings are held at which the problems of the industry are freely and frankly discussed in the fullest detail, and from which the industry derives a substantial advantage.

"It is true that we do not get everything we ask for, but within the limits imposed by the Government policy of bulk purchasing, I think it right to say that we do receive sympathetic consideration and help from the Ministry.

"One of the regular subjects of discussion at these monthly meetings during the past year has been the relation between the prices at which non-ferrous metals are sold to us by the Ministry of Supply, and the world price at which our foreign competitors can buy. We have not ceased to emphasise the disadvantage at which this places British industry, and in this I include not only ourselves, but also our customers whose products, incorporating non-ferrous metals, account for more than half of this country's export programme.

"Unfortunately, this is one of the subjects upon which we have received sympathy, but, so far, without action. We shall, however, continue to press this point, in the hope that the British price may be brought rapidly into relation with the world price.

"These meetings have also provided an opportunity to discuss the level of metal consumption. The federation views with some anxiety the continued shortage of high grade zinc, and is constantly pressing the Ministry of Supply on this point.

"The first object of the federation, stated in its constitution, is 'to serve the interests of the community by securing production of the maximum output at the lowest price consistent with the maintenance of quality and the provision of fair remuneration for labour and capital.' This is an effort to put into words the principle which has guided the industry for many years and which has always been embodied in the work of both the trade associations and of the federation.

"Free Men"

"We believe in private enterprise, but this does not mean the absence of discipline or disregard of the public interest. It means that we believe that in the long run the only satisfactory form of discipline is that which is voluntarily undertaken by free men.

"It used to be said that the system of private enterprise was on its trial. From some of the recent developments it seems to me that it would perhaps be truer to say to-day that it has been condemned without a trial.

"Under the recent Industrial Organisation and Development Act, the Government is experimenting with the establishment of so-called Development Councils, consisting of a mixture of individuals drawn from various categories, whose object appears to be to give instructions to those who are actually concerned with the industry as to how they should conduct themselves.

Need for Vigilance

"I hope that the day is far distant when anyone would desire to make such an experiment with our industry. We have always had complete liberty in the past and we feel that we have made the best use of that liberty and that our industry may well serve as a model, but in the words of Edmund Burke 'the price of liberty is eternal vigilance.' We must be vigilant to conduct our affairs with the greatest possible efficiency and the minimum waste of time, material, and manpower. Our house is at present in order; it is up to us to keep it so."

Earlier, the chairman mentioned that,

(Continued overleaf)

Reopening the Metal Exchange

Users' Scheme Submitted to the MoS

REPRESENTATIVES of producing and consuming interests in the non-ferrous metals industry attended a meeting of the London Metal Exchange last week to hear details of a scheme for the re-opening of the metal market.

The chairman pointed out that the chief reasons for not re-opening the market, as put forward by the Ministry of Supply, were currency difficulties and scarcity of supplies. The exchange committee was confident that, apart from the safeguards it proposed to apply, any irresponsible attempt to influence the price structure could effectively be dealt with by the revisions which have been made in the rules and regulations of the exchange.

"Flexible" Licensing

The market which the exchange contemplated would in the transition stage not be a "free market" in the same sense as the term was understood before the war. It

was proposed (a) that it should function as regards tin within the framework of the allocation scheme, so that no country could acquire an extravagant supply to the detriment of any other; and (b) as regards other metals under a system of United Kingdom domestic licensing and export permits as at present in force.

So as to meet changes in the situation which an open market would undoubtedly disclose, the metal exchange would like to see a little more flexibility introduced into the manner in which international tin allocations were made and also in the way in which licensing procedure for other metals was carried on. An open market, even within the limitations suggested, would give a more accurate picture of actual conditions governing supply and demand and a price more truly representative of world values.

The committee has submitted details of the plan to the Minister of Supply and discussions are expected to begin shortly.

NON-FERROUS METALS FEDERATION

(Continued from page 77)

"When the federation was newly formed in 1945, one of our earliest activities was the collection and publication of statistics. This branch of our activities has developed very considerably during the past three years, and the federation statistics department has now been called upon to undertake a larger and even more important responsibility. The federation, in conjunction with the British Overseas Mining Association and the British Non-Ferrous Smelters' Association has established the British Bureau of Non-Ferrous Metal Statistics with the object of collecting and publishing comprehensive statistics of production, consumption and stocks of non-ferrous metals in the United Kingdom and throughout the British Empire.

"This venture has the whole-hearted support of the Ministry of Supply and of the principal producers and consumers in this country and all the Dominions and Colonies. This new development is, in my view, of the utmost significance and we are looking forward to receiving the first number of the bulletin in the course of the next few weeks."

The elections, in addition to that of the president, conferred office on the following: Vice-presidents: Mr. W. J. Terry, Mr. W. H. Henman, Mr. H. E. Jackson; trea-

surer, Mr. A. L. Johnson; chairman of the executive committee: Mr. Horace W. Clarke.

Ceramic Congress

A group of Netherlands ceramic industrialists and technicians, with the co-operation of the British Ceramic Society is organising an International Ceramic Congress which is to open in Maastricht, Holland, on September 12. Support has been promised from the ceramic industries of Italy, Denmark, Norway, Sweden, France, Belgium and Switzerland. Arrangements in this country are in the hands of the hon. general secretary, British Ceramic Society, The Mellor Laboratories, Hanley, S.O.T.

Education Abroad.—British students requiring information about the educational facilities and opportunities for specialised study available abroad are invited to contact I.B.A., International Correspondence Service, Karlsruhe-Durlach, Pfingststrasse, 69, U.S.-Zone Germany.

ACTIVATED CARBON FROM COAL

Conversion and Testing Processes

From a Special Correspondent

COAL is still relatively a cheap material when it is considered that from it can be made, by simple processes, activated carbon worth from £30 to £60 a ton. Within the past few decades activated carbon has been developed throughout the civilised world for use in decolorising processes, gas and vapour adsorption, the purification of water and other materials.

To a great extent it has replaced the time-honoured charcoal in such techniques and it owes its efficiency to the fact that it has a much greater adsorption capacity—due to its large surface area—weight for weight, than is obtainable with charcoal.

This greater efficiency has several advantages, for example, to achieve a specific result the quantity of activated carbon is much smaller than the charcoal needed. Both charcoal and activated carbon retain within themselves a portion of the material they are treating; so that the small amount of activated carbon used reduces losses by this cause.

Due to the much greater activity of activated carbon, it is possible to employ it in processes for which ordinary charcoal is entirely unsuitable. One example of this is the recovery of gases and vapours. In the modern industrial world there is, accordingly, a wide sphere of usefulness for activated carbon.

During the first World War, activated carbon was tried out in gas masks and was found very effective for the adsorption of certain poison gases. In the subsequent post-war years British manufacturers started production of activated carbon for gas and vapour adsorption and for decolorising purposes.

Raw Material

In spite of this British activity, until quite recently a big proportion of activated carbon used here has been imported. On the Continent of Europe its manufacture has been carried on to a much greater extent than here, and a study of patent literature shows that Germany and contiguous countries have prosecuted their researches in this sphere more vigorously than we have.

Generally speaking, many different carbon-containing materials may be used as raw material for activated carbon production. Wood, waste vegetable matter, grass, nut shells, etc., are all potential raw material for this purpose. If, for example, all the canning factories packed peas all the year round and sent the hulls to a common centre

that waste would provide all the raw material required in this country.

The farmer cannot spare his hay for carbon making, while neither wood nor nut shells exist here in abundance. The one raw material that we have here, all the year round, is coal. For this reason—which also applies to a less extent to European countries—coal is the one convenient raw material that can be used. If we enlarged our activities in this sphere, instead of importing carbon at around £40 a ton and exporting coal at around £2 a ton, we should soon be exporting carbon at the higher figure.

It is well known that all coal contains a high proportion of carbon; the higher this is for activated carbon production the better. The coal also should preferably be low in volatile content, sulphur and ash. These requirements obviously indicate anthracite as the most appropriate raw material.

Homogeneous Mixture

When coal with a high volatile content is used, it is generally most economic to use the coke instead of the coal itself. Neither lignite nor bituminous coal, used alone, produces a good quality activated carbon; the ideal mixture consists of anthracite with 30 to 40 per cent other coal, which avoids undue caking.

If, say, 100 tons of coal were converted, the resultant activated carbon would vary widely in its properties at different parts of the batch. This is because the raw material is not homogeneous. To secure uniform composition, the coal has to be crushed to small nuts, about 1 in. cross section, and mixed. Crushing is done in jaw crushers of suitable size and mixing may be carried out on a reciprocating metal screen which will eliminate the dust and slack at the same time.

The next step is to coat the screened nuts with a carbohydrate material, in such strength that the dried coating forms about 0.5 per cent by weight of the coal. Material in use for this purpose includes starch, glucose and molasses solutions. These may be applied to the nuts through the usual type of coal-washing plant, or by the use of a shaking screen, the solution being sprayed on the nuts from overhead. The latter method enables the surplus solution to be trapped and re-used.

Carbonising retorts and activating retorts generally stand on the same site, so that the

gas from the former can be used in heating the latter; and in most gases one or more gas holders are used as a reserve supply. Iron retorts are normally used for carbonisation and the process is carried out in two stages, the temperature not being high enough to crack the gases coming off. Cracking would result in the deposition of carbon on the surface of the material, and this carbon black could not be activated.

A temperature is therefore maintained just high enough to eliminate the bulk of

rejected portion passing again through the rolls. The powder has now a silky feel to the touch and is practically black in colour, due to the incorporation of the carbohydrate matter; but it does not yet possess any activity.

Activation

The most common activating medium is steam, and to a less extent gasses, such as water gas, producer gas, or hydrogen. A typical German retort for the activation process (covered by German patent 336,797) is shown in outline in Fig. 1. The retort is of the vertical pattern and within the steel shell are fixed a number of tubes F. These tubes contain the powdered material to be activated, so that the latter is exposed over a wide area to the hot gasses surrounding the tubes and heat penetration to the centre of each tube is very rapid.

The hot gases enter at A and leave at D; while the steam goes through B and drives out gases at C; the retort being charged through a manhole at the top and discharged through the bottom. Entrance and exit are covered by hinged, gas-tight man-hole steel plates.

Near the bottom of each tube is a steel cone E, perforated throughout its surface to allow the reaction steam to pass up the tube. These cones serve to spread the steam in a uniform stream through the contents of the tube, and also to support the charge in each tube. Any individual cone may be lowered irrespective of the others, so that a sample can be withdrawn from a particular tube and, if necessary, longer treatment be given to individual tubes.

The powder in the tubes is initially merely an absorbing mixture of amorphous carbon and hydrocarbons. As steam passes through the powder, at a temperature of about $910^{\circ}\text{C}.$, oxidation occurs and the hydrocarbons are eliminated, followed by the much slower oxidation of the amorphous carbon.

A little more than half the gas coming from the retort after passing through the powder is hydrogen, when steam is the activating medium, the remainder being a mixture of CO and CO_2 . This gas mixture, not unlike water gas in composition, is also stored for heating the retorts. The period required for the activation process is generally of the order of 4 to 5 hours; the exact length of treatment being governed by the operating temperature, quality of raw material, and amount and pressure of steam passing into the retort.

Testing

Even the expert cannot judge the quality of activated carbon by looking at it or touching it, for its appearance is no

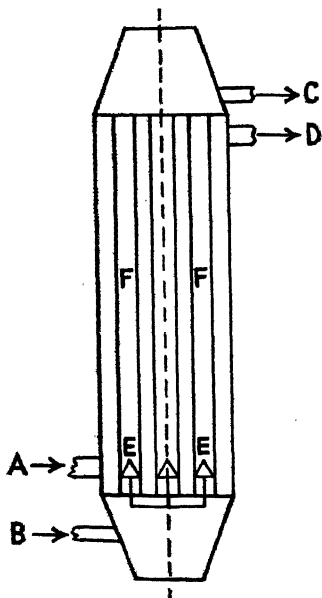


Fig. 1

the volatile matter, and is usually between 470° and $480^{\circ}\text{C}.$ This temperature is held for two hours, after which it is slowly increased, so that at the end of the third hour $750^{\circ}\text{C}.$ has been reached. This temperature is held for about three hours.

The importance of using raw material of low volatile content is, of course, fundamental. A large proportion of volatiles cannot be adequately expelled without elevating the temperature to a range at which some of the gas invariably cracks and deposits inert carbon on the material, so preventing its thorough activation at a later stage. High volatiles also mean big carbonising losses in terms of weight lost in raw material.

At the end of the heating cycle the material is allowed to cool, removed from the retorts, and ground to a fine powder between steel crushing rolls. It is then put through wire screens of about 150 mesh, the

criterion of its efficiency. A certain amount of routine testing of each batch is necessary. Such routine tests include estimation of moisture, which is nil when the material leaves the retort, but rapidly rises to around 7 or 9 per cent when the product has stood for some hours exposed to the surrounding atmosphere.

Another examination is the screen test, which is accomplished by passing the carbon through wire sieves of different mesh and noting the proportion of each particle size. The proportion of water-soluble matter is usually ascertained, and also the pH value of distilled water that has been boiled with the carbon; such value being returned as the pH value of the carbon.

Oil Retention

Perhaps the most important test is, however, the determination of the amount of oil which the carbon will retain when brought into contact with oil. Such information is of vital importance to oil refineries which use the activated carbon for decolorising and purification purposes. For the value of the carbon is governed not only by its activity but also by the proportion of oil it will retain, for oil so retained represents a loss to the refiner.

There are two distinct tests for measuring the behaviour of the carbon when in contact with oil. These are the oil saturation value (OSV) and oil retention value (ORV). The OSV of a carbon is a function of the apparent density, while the latter is governed by the particle size of the carbon; so that for a specific particle size of carbon there is an approximate figure for its OSV. These particular tests have been well developed in the U.S.A., by the Darco Corporation, and are being adopted in this country.

The apparent density of a carbon is determined by measuring the volume occupied by a known weight of carbon when packed so that it will not decrease in volume by continued tamping, or by measuring the amount of carbon which may be packed in a container of known volume. To do this, one determines the approximate weight of dry carbon necessary to fill a 100 c.c. graduated glass cylinder to the top graduation. This quantity of carbon is then weighed out and transferred to a cylinder. The latter is then closed with a stopper to avoid loss of carbon and the cylinder tapped gently on a table until no further settling of carbon occurs. The volume occupied by the carbon is then read off, and the apparent density is equal to the grams of dry carbon taken, divided by the volume, in c.c., occupied by the packed carbon.

The OSV of a carbon is expressed as the grams of oil required to wet 100 grams of carbon; the test being carried out as

follows. A small weighed sample of carbon, 5 to 10 grams, is placed in a 250 c.c. porcelain casserole the clear oil is then added slowly, drop by drop. After each addition the carbon is stirred gently, care being taken to see that all traces of oil have disappeared before adding more oil. The carbon mass will ball, either forming one or a few large lumps; the end point being reached when the casserole shows the first trace of streakiness. This becomes quickly apparent, for previous to the addition of the last few drops, the surface of the casserole becomes perfectly clean and bright. The oil saturation value is ex-

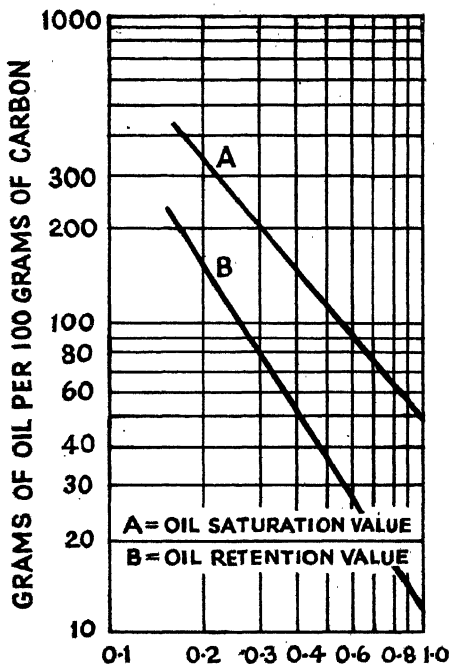


Fig. 2

pressed as grams of oil per 100 grams of dry carbon. If the oil has been added from a burette the volume is known, and knowing the specific gravity of the oil, the OSV is readily calculated.

The oil retention value is a measure of the oil held in the cake of a filter press after blowing the press, and it is expressed as grams of oil per 100 grams of carbon; the test being carried out as follows. One hundred grams of dry carbon are mixed with four litres of oil and heated to 50-55°C. This mixture is then filtered through a laboratory plate and frame press which has been pre-heated by blowing steam

(Continued overleaf)

Oils and Fats in S.E. Asia

Large Production Plans Formulated in India and Ceylon

ARTICLES available in Japan as war reparations to Ceylon include plant for the production of caustic soda. This is capable of stimulating the soap, textile, and paper industries. By-products of the electrolytic process, such as bleaching powder, chlorine and hydrochlorine acid will also be useful.

* * *

In his presidential address to the first South Indian Soap Makers' Conference held in Calicut, Rao Sahib A. K. Menon said that the price of soap was bound to increase unless supplies of coconut oil were augmented by imports from Ceylon and the Philippines. He also suggested operating a factory exclusively for vegetable tallow. There were several kinds of indigenous vegetable fats such as dupa fat, kootum fat, etc., the production of which could be stimulated by organised effort. Several essential oil bearing trees, herbs, etc., would also yield appreciable quantities of oil. Systematic planting should be organised on a commercial scale. Regional experimental stations should be established and suitable plants selected for cultivation. Such stations might be set up in the Nilgiris for eucalyptus, geranium and gultheria, in Cochin or Travancore for lemon grass and picholi, in Mysore for sandalwood, in Malabar citrus oils, cinnamon and ginger oils, and in the Central Provinces for palmarose and citrus oils.

* * *

Mr. Menon also recommended the Central and the Provincial Governments to regulate the export of sandalwood oil. It was necessary that the manufacture of synthetic products should be attempted on a large scale so that India could become independent of foreign supplies. He advocated making strong representations to the Government of India to give effect to these proposals.

* * *

Recent developments in the establishment of a synthetic petrol industry in India include the possibility of the erection of a factory, jointly owned by the Indian Government and an American oil company, and a scheme for introducing the underground gasification method where coal deposits prove uneconomic for surface processing.

Reports from Indian commercial circles suggest that the new factory will be erected in Bihar and that the Government, contributing 51 per cent of the total capital, will control policy, while the U.S. concern will

provide the remainder of the capital and the necessary technicians to supervise the working of the plant.

The Government has received a recommendation from the Fuel Research Committee that a statutory levy of $\frac{1}{4}$ anna per ton of coal despatched in India should be imposed to aid fuel research.

ACTIVATED CARBON FROM COAL

(Continued from page 81)

through it for 10 minutes before filtering. The oil-carbon mixture is then put through the press under a pressure of from 30-40 lb. per sq. in. After filtering, the press cake is treated as follows, while still in the press. The cake is first blown with air for 15 minutes at 40 lb. pressure, it is then blown with steam for 15 minutes at 30 lb. pressure, and finally with air for 10 minutes at 40 lb. pressure. The cake is then removed from the press, mixed thoroughly and a sample taken, from which the amount of oil still retained can be found by solvent extraction.

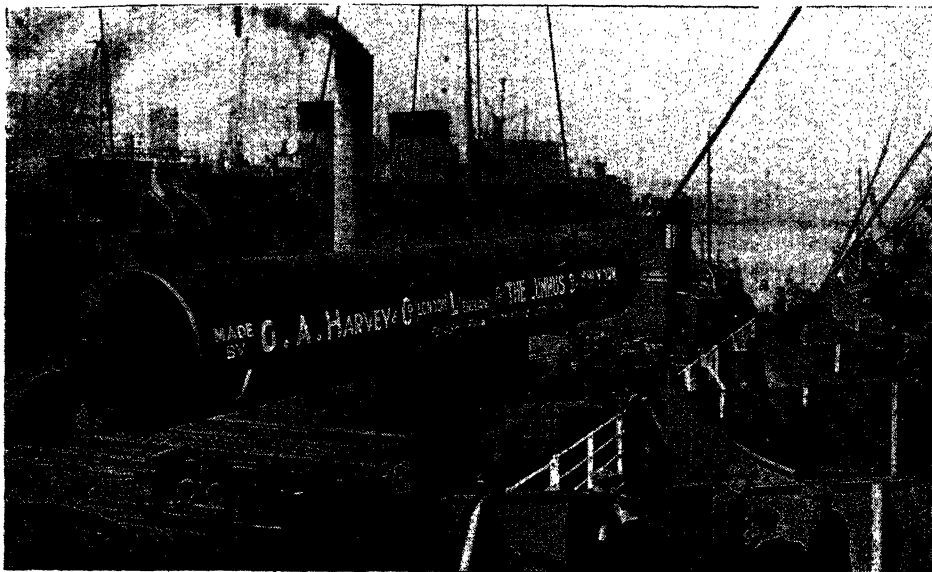
The following table gives the apparent density, the OSV and the ORV of various grades of carbons.

Carbon Number	Apparent Density grams per c.c.	Grams of oil per 100 grams Carbon	OSV.	ORV.
1	0.245	258.0		105.0
2	0.252	249.0		98.4
3	0.270	220.0		105.0
4	0.275	222.0		98.0
5	0.288	183.0		72.4
6	0.292	185.0		71.4
7	0.295	204.0		72.2
8	0.310	179.0		70.3
9	0.320	175.0		68.3
10	0.390	148.0		39.0
11	0.485	125.0		36.1
12	0.515	118.0		33.0
13	0.540	110.0		29.0

If the logarithm of the OSV be plotted against the logarithm of the apparent density, it will be found that the points fall nearly on a straight line. Likewise, a logarithmic plot of the ORV against the apparent density gives a straight line. Both these lines are seen in Fig. 2 (previous page), and from an inspection of these it is seen that a carbon of high apparent density will retain a much smaller quantity of oil in the press cake than will one with a low apparent density.

Unlicensed Construction.—I.C.I. (Explosives), Ltd., was fined £100 and ordered to pay £11 4s. 4d. costs for constructing a road at the Tuckingmill factory, near Camborne, Cornwall, without a licence. A fine of £25 was also imposed on Mr. G. Davies, deputy works manager.

An Engineering Odyssey



These pictures represent the culminating stages in an engineering odyssey, of which we illustrated the beginning in London ("The Chemical Age," April 17). They record how the 83 ft. fractionating column for Shell Petroleum's new refinery at Cardón, Venezuela, was loaded aboard at Royal Albert Dock, cast overboard at Punta Cardón to be floated ashore, and finally added its imposing bulk to the refinery skyline

[Courtesy of "The Shell Magazine."]

GERMAN WOOD CHEMISTRY

Wartime Production of Food and Chemicals

THE BIOS Final Report No. 3, just issued by H.M. Stationery Office (6d.), summarises with extreme brevity some 40 or more FIAT and BIOS reports on the German timber and allied industries. It is nearly unique in that as many pages are occupied by index and references as by actual text, but the index has, of course, to represent all the original reports.

The first five summaries deal with composite wood manufacture, wood bending, pencil manufacture, wood structural research, machinery and equipment. Of more interest, but unfortunately very brief, are the remaining three, the chemical section, relating to preservatives substituting creosote, restricted use of creosote, and chemistry of wood and its products.

Until 1940, creosote accounted for 90 per cent of German wood preservative needs; then it was replaced by waterborne products—Flunax, Basilit, Wolman salts, and zinc chloride. Details are given in FIAT final report (No. 480), in which the view is expressed that, in this field, German technique was 30 years behind American. What little creosote was allowed for timber preservation was probably used for marine timber (FIAT, final, No. 478).

In the production of sugars, alcohols, and yeasts, as is known, two processes had been used to effect hydrolysis of wood to reducing sugars: (1) the Bergius, using cold concentrated HCl (BIOS Nos. 7, 176, and 202); (2) Schöller, using dilute H_2SO_4 under pressure (BIOS Nos. 176 and 202). The latter is considered the more efficient and economical.

The neutralised solution of sugars from soft or gymnospermic woods by either of these methods is for the most part fermentable by baker's yeast to give ethyl alcohol. After addition of suitable nutrients the sugar solution can also be used to support growth of good yeast (*Torula utilis*, etc.).

Only about 66 per cent of the sugar from hardwoods (angiosperms) is fermentable by baker's yeast, but food yeast can utilise all the sugars from this source, and large quantities were used as food during the war. Extracts from autolysed food yeast were said to have a high B group vitamin content (CIOS XXIX-5 and BIOS, final, No. 5).

In the sphere of wood distillation, no research was done on carbonisation, and charcoal needs were supplied mainly from the 11 plants of Degussa (Deutsche Gold, etc.) using the Reichert process, in which the retorts are heated by recycled hot

gases given off in distillation; this secured relatively accurate temperature control in the 100 cu. m. retorts.

The original reports describe the refining, etc., of these volatile products. Melakol, a plasticiser for reclaimed rubber, is prepared from the wood tars. Other products are flotation oils and four types of inhibitor, activated carbon, etc. Beech wood is used almost exclusively for wood distillation (FIAT, final, 444 and BIOS, final, No. 128).

Vanillin has not yet been produced from sulphite liquor on a commercial scale, but details are given of a method proposed by strong alkaline cleavage of sodium lignosulphonate in copper vessels. It is claimed that the copper of the vessel has a catalytic effect on the cleavage reaction, which produces high yields of vanillin with low consumption of alkali (FIAT No. 448). Tanning agents were prepared from spruce sulphite waste liquor freed from sugars by previous fermentation with yeast. The artificial tanning liquors have been used to good advantage to supplement and improve blendings of the rather scarce natural tannins (BIOS, final, No. 157).

Only two alternatives for wood and cotton as sources of cellulose were used: (1) cereal straw prehydrolysed to remove pentosans and pulped by the sulphite process; (2) *Arundo donax*, a reed prevalent in N. Italy and readily pulped by the bisulphite method. Laboratory tests were also made with rape fibre, esparto, and sorghum bagasse. Potato haulms were found unsuitable (FIAT, final, No. 450 and 490).

Although it is said that cellulose research was not particularly fruitful, some interesting information was obtained from Dr. Schöller (interviews in No. 450) on important advances in wood sugar fermentation to yield alcohol and/or food yeast. At the Bergius Research Laboratory, also, details were obtained of a process for continuous hydrolysis of wood with concentrated HCl.

In BIOS, final, No. 135 a short account is given of the work of Dr. Runkel on some 80 species of tropical woods as possible sources of cellulose. It is thought that these could be treated to yield paper and rayon pulps either by the sulphate process or that of Runkel, involving: (a) digestion of chips under atmospheric pressure with 3.5 per cent aqueous NaOH at 100°C.; (b) defibration in a rod mill; and (c) further delignification and bleaching by sodium chlorite in the presence of acetic acid (see also BIOS, final, No. 18).

FRENCH HYDROGENATION AND FRACTIONATION

Varied Yields of Low Temperature Processes

THE first description in some detail of certain aspects of recent research in France on the manufacture of fuel oil by hydrogenation has now been made generally available. This work was undertaken with the support of the French Government to provide a comparative study of the existing processes.

This review (*Chim. et Ind.*, 1948, 59, 548-551) is a paper by Louis Thibaut, director of the Cie Française des Essences Synthétiques, which was originally presented at the XX Congress of Industrial Chemistry in Paris.

Works were constructed at Liévin for trying out the process of the Soc. Nat. des Recherches by the C.F.E.S.. The latter company, also, after much preliminary research, evolved a method which was first tested about 1938. It consisted essentially in a progressive hydrogenation with simultaneous fractionation of products, the lighter fractions being withdrawn while the heavier are subjected to complete digestion. A new catalyst is also used.

Economies

Considerable simplification of plant and reduced cost of operation are claimed. Applications were made for patents in France and the U.S.A. (French application Nos. 450,376 of 17/8/39; U.S.A., 3/2/45; 478,267 of 16/4/43; and 472,220 of 5/10/42).

Subsequently the heavier fractions from coal, especially tar oils distilling above 300°C. and the like, were hydrogenated by the new process, whereby many new products, including lubricants, were obtained.

The hydrogenation is effected at a gradually increasing temperature, from 300°C. up to 500°C., in such manner that the action of the hydrogen is more and more effective or intensified. To prevent destruction at a higher temperature of products formed at a lower, these are withdrawn into a zone cooler than that in which they were formed. The various products are thus hydrogenated at the lowest possible temperature and removed as formed.

A single autoclave is used, divided into compartments providing for ascent of gas and descent of liquid, after the manner of a still; and providing also for introduction of suitable catalysts at the proper stages.

The material to be treated, finely powdered and forming a paste with oil from

a previous operation, is introduced into the upper part of the autoclave under pressure of 250-500 kg/cm² and at a temperature below 100°C. The hydrogen, also under suitable compression and at 450-500°C., is introduced at the bottom, carrying the lighter products with it in its upward progress.

Special Features

In this way there is established a gradually increasing temperature in the autoclave from about 300°C. near the top to 500°C. below. Certain products are removed by the means described and illustrated, and the hydrogen current and mixture of medium oils passes into an auxiliary autoclave containing a fixed catalyst for conversion of these oils into spirit.

The catalyst, hereafter described, is very active and not greatly affected by the hydrogen/oil ratio. Conversion into spirit is total in one passage, except for a certain amount of medium oil left unchanged for use with the next charge.

Among the special features to which attention is directed are: (1) Simplified working and more efficient hydrogenation; (2) the medium oils, being obtained at the minimum temperature, are richer in products which greater heat destroys, such as the lighter phenols; (3) the upper part of the autoclave has to be cooled to ensure the requisite scaling down of temperature, so that the raw material in paste form can be introduced at about 80°C., thus making unnecessary its pre-heating — usually a costly and difficult operation (4) the medium oil may be directly converted into spirit without a lot of supplementary treatments; (5) residues withdrawn at the bottom where hydrogenation is carried to an advanced stage are for the most part free of any material suitable for further treatment.

Here, again, troublesome separations or the like and the apparatus required for such processes may be dispensed with. From trials made with a pilot plant (20 tons daily) with combustible material from the Bouche-du-Rhone and Landaïs coal-fields it was found that the saving on total power required and on labour, compared with the "classic" processes, was about 40 per cent.

Attempts to find a cheaper and more efficient catalyst than the usual molybdenum or tungsten type on porous supports led to iron sulphide plus some cyanide or

sulphocyanide of iron, chromium, or aluminium. The new catalyst thus consists of iron sulphide supported on active carbon and activated by small amounts (up to 3 per cent of sulphide) of cyanide and sulphocyanide of the metals named.

The new catalyst is prepared by the wet method in ammoniacal medium, and care must be taken to eliminate from the final product all traces of ammoniacal salts. Hydrogenation is said to have been carried to 95 per cent in one cycle. At the temperatures used formation of gaseous hydrocarbons is less than usual, and octane number is raised to 77.

In attempting at first to hydrogenate the heavy fractions of anthracene oils, coming over above 300°C., it was found that, with a finely divided orthodox catalyst method, these fractions were not transformed even at 450-460°C.; but at 380°C. with the new catalyst profound changes occurred.

The crude product had a density of 1.040 as compared with 1.160 for anthracene oil. It was clear and fluorescent, stable at high temperature, with no appreciable content of asphalts or heavy constituents insoluble in petrol or benzene, and no anthracene smell.

Efficiency was up to 90 per cent hydrogenation, and hydrogen consumption per ton of heavy oil treated was 1000 cu. m. Yields were 45 per cent medium oil for conversion into spirit; 25 per cent oil of viscosity 1.7 Engler at 50°C., suitable for transformer or lubricating oil; and 30 per cent oil of viscosity 4.

The heavier oils (red oils) from tar distillation *in vac.* could be similarly treated, with 92 per cent yield and hydrogen consumption of 1000 cu. m., 20 per cent of the product being suitable for conversion into spirit, 20 per cent for transformers or refrigerators, and 60 per cent very viscous (25 Engler), for lubricants and other mixtures.

WORLD RUBBER ESTIMATES

NEW estimates of world rubber production made last week by the chief of the U.S. Department of Commerce's rubber division, Mr. Earl W. Glenn, foresaw increases in production totals and use of rubber in the U.S.A. in 1948. Total world supply of new rubber material this year, according to this estimate, is expected to be about 2 million long tons, natural rubber accounting for 1.45 million to 1.5 million tons of the total. Synthetic rubber produced in the U.S.A. and Canada would account for the remainder.

Foreign demand for natural and synthetic rubber is expected to total about 825,000 tons.

New Canadian Industries

Industrial and Scientific Progress Report

BY the formation of Northern Chemicals, Ltd., with the aid of U.S. capital, Canada will become a major contributor to the lithium industry. The Lithium Corporation of America has a substantial interest in Northern Chemicals, which is now developing what is believed to be the largest single world deposit of ore in the Cat Lake area of Manitoba. The high chemical activity of lithium makes it and its alloys very effective refining agents for degassing and purifying copper, bronze, aluminium, magnesium and steel. Lithium salts and compounds are also incorporated into porcelain enamels, glazes and ceramic bodies and produce greater fluidity and retention of lustre and colour.

A cellulose sponge plant requiring an investment of more than \$600,000 is to be opened at Shawinigan Falls, Quebec, by Canadian Industries, Ltd. The plant will be adjacent to C.I.L.'s present Cellophane works and will begin operation by middle of 1949. Cellulose sponges, which have never before been made in Canada are closely related to rayon and Cellophane and are made by processing wood pulp, caustic soda, hemp, salts and other materials. They are said to have all the essential properties of natural sponges, are more durable and can be cut to any required size or shape.

Radio Active Materials

Radio-active materials derived from the atomic energy plant at Chalk River, Ontario, have "countless uses" in medical and industrial research, records the National Research Council of Canada in its 31st annual report, reviewing the several branches of science and technology to which particular study has been given. The president, Dr. C. J. Mackenzie, reported that 1000 skilled workers, half of them scientists "and many having world reputations in nuclear physics, were concentrating on producing radioactive materials and on revealing fundamental knowledge." Practical results had already been achieved in human, plant and animal physiology by application of the products of the two radioactive piles. A 5 million volt generator was under construction. Fundamental research had been started on the nature and source of cosmic rays, colorimetry and photometry had been expanded satisfactorily, and laundry and dry cleaning, protective treatments for stone and atmospheric pollution were among the industrial subjects now undergoing research.

WORK ON ARSENIC INSECTICIDES

The Quest for Non-Toxic Preparations

DESPITE the introduction in recent years of many new insecticides and fungicides, arsenic in some form or other still remains the basis of many of the most effective preparations. A valuable review of the extensive literature which has accumulated in this field is given in the *Zt. f. Pflanzenkr. u. Pflanzenschutz*, 1948, 55, 35-53, by Walther Trappmann, containing nearly 200 references.

Under present world conditions affecting agricultural production and in view of the increasing seriousness of pest attacks, this matter of effective plant protection deserves to take priority in fundamental science and practical research.

The most important of the arsenic materials used for plant protection are in the form of either spray or dusting mixtures. Since the water-soluble arsenic compounds are injurious to plants, the main raw materials are the insoluble compounds, such as copper aceto-arsenite (Schweinfurth green), lead arsenate, and calcium arsenate, with appropriate admixtures. To a smaller degree, other metal arsenates as well as arsenic sulphide and London Purple (arsenate and arsenite of lime) are used or tried experimentally.

Minimising Toxicity

The chief advantages of arsenic preparations are their chemical stability, with which of course are associated durable efficiency, wide range of application, economy and relative ease of manufacture, and the possibility of combined use with other pesticides. On the other hand they have the serious disadvantage of toxicity to plants, animals, and human beings. By careful manufacture, however, and keeping water-soluble compounds and impurities down to prescribed limits or adding slaked lime to convert any soluble into insoluble compounds, risk of injury can be minimised.

The addition of various colloidal materials is also helpful, e.g., iron oxide, calcium caseinate, glue, gelatine, molasses, etc., also animal, vegetable, or mineral oils and emulsifying agents. Differences between the primary, secondary, and tertiary arsenates in solubility and hydrolysis, for example, must also be taken into account.

In Germany, in the case of lead arsenate, the basicity of this, as determined by the Biologische Reichsanstalt, is given by the quotient $\text{As}_2\text{O}_3/\text{PbO} = 0.481 - 0.447$, corresponding to 60-80 per cent di-arsenate and 20-40 per cent tri-arsenate.

Hydrolysis will depend to a large extent on fineness of material. If too fine, up to the colloidal stage, there is greater risk of injury to plants, but attempts to reduce this risk by vigorous stirring in preparing calcium arsenate, or by heating this arsenate for three hours above 100°C . may make the product safer, although less efficient.

For use in fruit culture, especially against the codling moth and its larvae (*Cydia pomonella* L.) arsenic preparations are the most effective, although earlier experience in the U.S. suggested that the continued use of these insecticides might produce a more or less immune type of *Cydia*. This difficulty has been overcome by adding various materials, including fish- or mineral oils with a suitable emulsifier—to the arsenic compound to improve its adhesive and weather-resistant properties.

Fruit Tainted

Typical examples of this type of insecticide are the American sprays consisting of lead or calcium arsenate, zinc sulphate, oleic acid, petroleum, triethanolamine or ammonium oleate. The increased adhesion attained by these preparations, however, necessitated the introduction of stringent washing regulations in fruit-exporting countries because of the amount of insecticide covering the fruit when gathered. Since 1932 efforts have been made, particularly by the U.S. Bureau of Entomology, to find a suitable arsenic substitute.

A similar type of arsenic preparation has been used in Germany in the vineyards, but was usually only permitted as a protection against the first breed of larvae. Arsenic taint and poisoning risk in fruit reached a rather alarming stage at one period, and two German firms, the I.G. and Merck, introduced preparations for neutralising this effect. These, however, did not prove very effective, and again attempts were made to find arsenic substitutes.

Fluorine Compounds

As a result, fluorine compounds were adopted in the U.S.A. for a time, but in Germany the Biolog. Reichsanstalt declared them to be unsatisfactory for fruit crops in that country. Another inorganic substitute, cadmium oxide or hydroxide, suggested by Ginsburg, also proved ineffective and other methods of pest control, including improved mechanical trapping devices, spraying apparatus and the use of various materials such as dinitro-o-cresol, oil plus

nicotine mixtures, etc., were all introduced with varied success.

Natural substances such as nicotine, pyrethrum, derris, are, of course, well known, and a wide variety of mixtures with these and other materials is described in the literature, including numerous stabilisers, activators, and other additives or improvers. Few of these were really effective arsenic substitutes, but a certain degree of success was achieved in Germany with quassia chip infusions for spraying (*Forest-Merck*).

Review of Data

A large number of synthetic organic preparations have been tested, the literature of which is briefly reviewed by Trappmann. These include many thousands of compounds and more than a thousand literature and patent references, of which only a few are mentioned here. Details are given in the *Jnl. Econ. Ent.* (U.S.) 1936, 29, 417-420; 856-9; 532-7; 1027; 467, etc. Phenothiazine possibly deserves special mention (*Better Fruit, Portland*, 1937, 31). Guy investigated nearly 100 organic compounds in 1937

(*Bull. Del. Agric. Exp. Stat.* No. 206, Newark).

In Germany the greatest success appears to have been achieved with the gamma isomer of hexachlorocyclohexane (Gam-mexane, etc.) known under various trade names—Nexit, Nexan, Viton; also the Bayer E 605, introduced in 1946 as Bladan-Neu, is the subject of high claims. This has great stability, is innocuous to human beings and plants, may be used in conjunction with fungicides and is easily and cheaply prepared. It is said to be not only a complete arsenic substitute, but far superior to any other known insecticidal contact or ingestion poison.

Another German material is Nirosan (Stillwaag: on arsenic substitute, *Angew. Bot.* 1939; 52, 210).

Belgian Economic Survey.—The third in the series of Overseas Economic Surveys, "Economic and Financial Conditions in Belgium," with an annex on the Grand Duchy of Luxemburg, was published on Monday by H.M.S.O. (1s. 3d. net).

Trade with Turkey : More Scope for Pharmaceuticals

A FURTHER expansion of the Turkish market for British pharmaceutical supplies, at the expense of Switzerland and the U.S.A., is expected to result from Turkey's current shortage of dollars and Swiss francs.

Despite the priority allotted pharmaceutical imports by the Turkish finance authorities supplies, other than from the sterling area, are difficult and irregular compelling importers to concentrate more than ever upon establishing British contacts.

Outlining the prospects for British pharmaceutical firms entering the Turkish market for the first time, the journal of the British Chamber of Commerce of Turkey points out that imports are subject to special regulations imposed by the Turkish authorities.

Conditions of Entry

No pharmaceutical product may be imported into or sold in the country until a licence has been obtained from the Turkish Ministry of Hygiene. Once this has been granted, however, imports of that particular product are usually authorised without delay and exchange facilities granted. Any number of consignments can be imported against a health licence, but separate licences are required for each different product.

About four to six months elapses between the date of application and the issue of a licence and manufacturers are advised to send representatives to visit the Ministry personally so that any licence query can be answered promptly.

Each application for a licence involves the payment of about £10 in registration and analyst's fees, etc., and the licence is granted in the name of the agent-distributor who is held responsible for the quality of the imports.

Before granting licences the Ministry of Hygiene usually takes into consideration whether or not similar or substitute preparations are already being produced locally or if sufficient supply is already assured by previously issued permits. The price of competitive products is also taken into account.

Favourable Sterling Balance

An indication of the upward trend of British manufacture in the Turkish market is contained in a recent statement by a Turkish Government official in which he pointed out that Turkey's sterling balance amounted to £11 million. Last year at this time the balance was £16 million, a reduction of nearly one-third due to increased trade and insufficient reciprocal exports from Turkey.

NITROGEN, SULPHUR AND PEROXIDE

Fuller Documentation and Research in the U.S.A.

A NEW and comprehensive survey of the properties of sulphur, an appeal for U.S. Government support for research on nitrogen chemicals and a discussion of the problems involved in the handling of highly concentrated hydrogen peroxide were the main features of the recent symposium of the American Chemical Society.

Discussing the sulphur survey, Dr. J. R. West, of the Mellon Institute of Industrial Research, told the conference that, for the first time, all existing data on sulphur had been compiled into one publication, together with a graph of sulphur's thermodynamic properties.

"These data," said Dr. West, "should facilitate the engineer's work in the design of chemical plant equipment where sulphur is handled. In addition, this publication will help the scientist to recognise the inadequacy of the present information and may stimulate him to greater efforts in this direction."

Government Research Urged

Professor L. F. Audrieth, of the University of Illinois, urged Government support for research on vital nitrogen chemicals to bolster the country's peacetime economy as well as for national defence. Nitrogen, one of the few inexhaustible raw materials, because of the great potentiality of synthetic production, provided compounds essential in the manufacture of fertilisers, explosives, plastics, solvents, medicinals, and synthetic soaps.

"Certain nitrogen compounds, including ammonia and hydrazine, are actively being considered as fuels," he said. "With the necessity of conserving coal and petroleum supplies, it seems not unreasonable to consider these substances as alternative and special fuels."

Prof. Audrieth reminded the symposium that during the war the Germans experimented successfully with hydrazine, a watery liquid, as a power source for submarines. It is an excellent fuel, he said, because it burns with a hot flame and gives off no toxic fumes. Should a "National Science Foundation" be established in the U.S.A., funds for research on nitrogen chemistry might be made available through this agency, or it might even be desirable for the Government to set up research laboratories of its own, designed to facilitate fundamental investigations in this field.

Of the latest basic nitrogen chemicals, hydrazine and hydroxylamine, Prof. Audrieth said that ten years ago they were

laboratory curiosities. To-day they were being manufactured in substantial quantities in the U.S.A. and their availability had stimulated a tremendous amount of academic and industrial research designed to increase their commercial potentialities.

Handling of Peroxide

Discussing problems arising from the handling of concentrated hydrogen peroxide, Dr. F. A. Gilbert, an official of the Buffalo Electro-Chemical Company, Buffalo, New York, said that close study had recently been given by peroxide manufacturers, transport undertakings and Government departments to determine the nature of the risks involved and methods of overcoming them. With the assistance of the U.S. Bureau of Explosives, manufacturers had produced special containers and these were expected to reduce transit risks.

Dr. Gilbert pointed out that the chief danger in handling hydrogen peroxide lay in its ability to generate large amounts of water vapour and oxygen at high temperatures.

Investigations had proved, he said, that if the material was correctly handled there was no abnormal risk.

Permanent Exhibition

No U.K. Exhibit at Brazil's World Fair

A "PERMANENT international industrial exhibition" was opened last week at Quitandinha, south of Rio de Janeiro. No U.K. exhibit, it was stated, had been prepared when the exhibition opened.

The exhibition is being organised in a series of 50-day periods and it is intended that for the next 10 years manufacturers of commodities ranging from heavy industrial equipment to domestic goods will have an opportunity of displaying their products.

According to Count Alexandre de Lasta, the exhibition's representative in London, although British industry was not represented at the opening ceremony, U.K. products will be arriving for exhibit in October and British manufacturers are already ordering display space.

The exhibition is being sponsored by the Brazilian Government which has passed a special law to facilitate arrangements regarding customs duties and currency exchanges. Goods imported into Brazil for display at the exhibition will not be subject to customs charges until they are actually sold.

American Chemical Notebook

From Our New York Correspondent

THE Rubber Development Bureau, which the British Rubber Development Board established in Washington last year, is sponsoring a campaign on a wide basis to promote a much wider use of latex foam as a cushioning material for domestic furnishings. Its use in public seating and transport cushioning is already widely adopted in the U.S.A. The domestic field, potentially the largest of all, is capable, it is thought, of providing a very great stimulus to natural rubber sales.

* * *

A New York estimate claims that the iron and steel industry makes use of nearly 5 billion gallons of water daily, or about 21 million tons. In the aggregate, this is a greater tonnage than all the raw materials used annually by the industry, according to the American Iron and Steel Institute. Water is used as a solvent, catalyst, conveying medium for the transport of materials and disposal of waste, a diluent or dispersive medium, cooling or cleansing agent, and in the production and distribution of heat and power. About 150 tons of water are used for every ton of finished steel the industry produces.

* * *

Claimed to be more efficient than its European counterpart because it produces 50 per cent caustic liquid directly at the cell and is cheaper to construct, the Mathieson Chemical Company's stationary mercury cell (THE CHEMICAL AGE, August 16, 1947) will soon be licensed for use abroad, said an official of the firm recently. The company has appointed a technical staff under the direction of Dr. William C. Gardiner, who completed development on the electrolytic cell, to advise prospective licensees on construction, installation and initial operation of the apparatus.

* * *

The Monsanto Chemical Company, St. Louis, Mo., has announced that commercial production of a new vinyl plasticiser, known as Santicizer 141, is now being undertaken. Output of the new product will be raised to 10 million lb. per year to partially meet the increased demands for plasticisers for the manufacture of vinyl films and mouldings. The new product is designed as a primary plasticiser for polyvinyl chloride and polyvinyl acetate film, sheet, and moulded articles, and is said to be suitable for use with a wide variety of resins. According to laboratory tests, Santicizer 141 can be safely handled during processing and

its low temperature flexibility, together with high solvent and flame resistance, will enable it to be used in the production of curtains, table cloths, handbags and floor tiles.

* * *

Aroplaz 1081-M, a new alkyd soluble in mineral spirits, said to be compatible in all ratios with most melamine and urea resins, has been introduced by U.S. Industrial Chemicals, Inc., New York City. This high viscosity, medium-oil-length alkyd lends itself particularly well to industrial baking finishes, either alone or in combination with amine resins. It can be baked or air dried without amine resins for industrial goods and general utility finishes. This alkyd, it is thought, will enable economical production of high-quality finishes at considerably lower cost.

Competition for Aluminium

Dwindling Scrap Supplies in U.S.A.

OUTPUT of primary aluminium in the U.S.A. in April totalled 53,277 tons, an increase of 3 per cent on the March figures and the highest monthly total since August, 1944.

Announcing this, the U.S. Bureau of Mines stated that for the first time since April, 1947, sufficient power was available to keep most reduction plants in full operation, due to increased water supplies at the generating stations.

Scrap Prices Soar

The heavy demand for scrap aluminium continued its upward trend during April and, at the end of the month, prices of most secondary alloys were considerably higher than those for corresponding types of primary ingot—generally unobtainable. This situation has led the American Smelting and Refining Company, one of the country's leading refineries, to withdraw quotations on secondary aluminium ingot. An official of the firm said that the market no longer existed in the sense of supplies being available at reasonable prices.

Ingot Imports Drop

Imports of aluminium ingot into the U.S. in April, all from Canada, amounted to 5518 tons or 31 per cent less than in March and there was also a 12 per cent decline in the shipments of sheets, plates and strip. On the other hand, exports of alloy ingot and slab, principally to France and Germany, rose to 330 tons.

A MODEL RESEARCH CENTRE

Wide Objectives of B. F. Goodrich Laboratories

A RESEARCH centre "which will make it possible to bring scientific discoveries to maturity three or four times faster than at present" has just been inaugurated at Brecksville, Ohio, by the B. F. Goodrich Company. At the opening ceremonies, John L. Collyer, president of the company, said that "the centre is, we believe, the most complete industrial workshop of science now in existence." The six buildings on the 261-acre site are all equipped with the latest scientific tools and equipment.

In addition to probing the technical problems of crude and synthetic rubber, the new centre will conduct intensive research in chemicals, plastics, agriculture, horticulture and the application of nuclear energy to rubber manufacturing. Atomic energy's usefulness and effects in rubber and related materials will be the special responsibility of one laboratory.

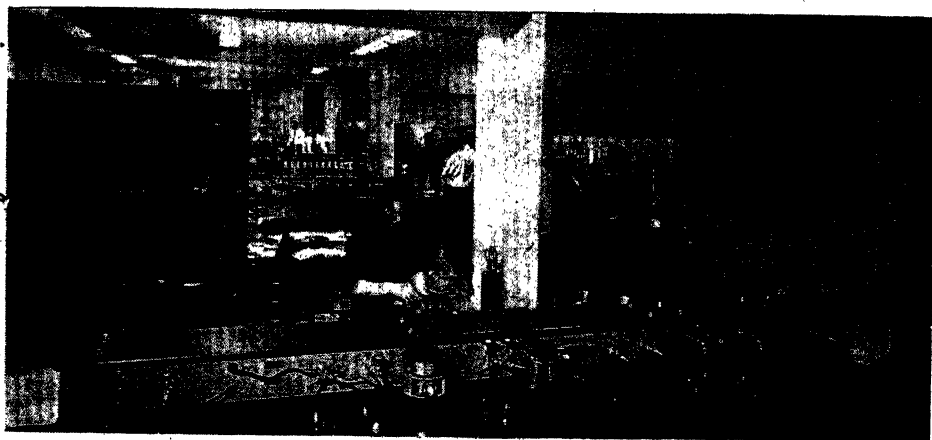
The main building is a three-story structure which contains no windows except at the ends of the hallways. It is 226 ft. wide, 172 ft. deep, contains 81 individual laboratories, a cafeteria, assembly hall seating 250, and a 10,000-volume library, the largest of its kind in the world.

Other units, isolated from main buildings, include one for extremely high pressure research, where 12-in. reinforced concrete barriers protect workers. Another is for experiment with gases and is equipped with

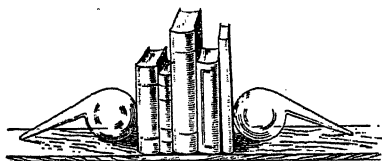


continuous ventilation under pressure. The third is for storage of volatile solvents, and a fourth for cooling the water for air conditioning.

The research centre will be under the direction of Dr. Howard E. Fritz, B. F. Goodrich vice-president for research, in addition to whom there are now 100 chemists, chemical engineers, physicists and engineers on the staff, of whom three physicists and three chemists are women.



Features of the main research laboratories, one of which is shown here, are the rubber-topped benches and the specially designed hoods, which draw 75 per cent. of their atmosphere from outside. Above, right: watching a reaction in one of the well-lighted, hooded recesses



A CHEMIST'S

BOOKSHELF

Chymia—Annual Studies in the History of Chemistry. Editor in Chief, Tenney L. Davis. 1948. Pennsylvania: University Press. London: Geoffrey Cumberledge, Oxford University Press; pp. xiv+190; price 20s.

It is singular that, at a time when many chemical concepts are undergoing change or are on the brink of it, in the light of new fundamental knowledge of the nature of matter, more than common attention is being paid to conjuring up the chemical ghosts of the past. While all eyes have in present circumstances more reason than ever to be focused on the immediate future, it is nevertheless not an inopportune moment to recall those who went before, both because of the true foundations on which the present edifice has been erected and for the false clues and occasional flashes of intuition which present knowledge has dismissed or triumphantly confirmed. We are indebted for the latest of the panoramas to the university workers of the U.S.A., an editorial committee of five under the editorship of Tenney L. Davis, of Norwell, Massachusetts, who have enlisted the distinguished support among science writers around the world, including F. Sherwood Taylor, J. R. Partington and John Read. The 13 sections preserve and revivify many of the long pursuits, in the course of which alchemy was transmuted into chemistry, and include in facsimile some entirely new documents relating to historical discoveries, and contemporary portraits and illustrations. The setting in which many of the events described took place was within these islands, although fitting record is included of some of the great workers in France and of some of the less tangible factors which aided Mendeleev in Russia clearly to formulate the periodic theory which several others, with the notable inclusion of J. A. R. Newlands in London, had so closely approached. *Chymia*, Vol. 1, as Eva E. Armstrong says in a foreword, is intended to promote international scholarship in the history of chemistry and to be a memorial to Edgar Fahs Smith, of the University of Pennsylvania, whose own devoted work as one of the all-embracing historians in that field is here engagingly recalled.

The Confessions of a Capitalist. Sir Ernest Benn. 1948. London: Ernest Benn, Ltd. Pp. 212; 8s. 6d.

Twenty-three years after they were originally published, most books concerned with contemporary affairs begin to take on an antiquarian flavour; others have no flavour at all. The thirteenth edition of this extremely individual testimony of one man's achievements, how they were brought about and the factors which aided them or sought to frustrate them, comes to-day as an even more apposite commentary on all our affairs than it was when it was written. Its re-publication in America and its translation into most of the Continental languages testify that its interest in the interval has not languished; now it has the additional great recommendation that the creed of personal responsibility and individual achievement, which it presents so well, is belatedly being recognised as our best hope of economic survival. These extremely frank and not at all humble "confessions," in their relation to current affairs, amusingly reflect one of those ironies with which historians are familiar. Much of the creed of this "reactionary" in 1925 has by imperceptible degrees been incorporated into Socialist Government policy of 1948. The posters of the Ministry of Labour and the National Savings Movement boldly proclaim the fruits of this miraculous conversion—on the road not to Damascus but to Marshall Aid. The text remains substantially unchanged and the author says in his preface to the 1948 edition: "It is my earnest hope that, in helping to explain the workings of private enterprise to a new generation, this book may encourage that spirit of personal risk and endeavour which never fails to show itself among Englishmen in a time of adversity."

Platinum Prices.—Following the rise in platinum prices recently announced in the New York market, one London firm is stated to have raised its spot selling rate from £20 to £22 15s. per troy oz. Last week Johnson, Matthey & Co., Ltd., stated its price for platinum metal was £19 10s.

Technical Publications

THE anxious attention which wartime shortage conferred on pyrethrum has left a legacy of interest in technical and production problems, which has now been recognised by the production of a specialised journal, *Pyrethrum Post*. This is the official publication of the Pyrethrum Board of Kenya, published from 2 Queen Anne's Gate, London, S.W.1, and provides in its first number a well presented and widely-based review of technical and cultural work on pyrethrum by authoritative contributors. Among the most interesting of these, from the specialised viewpoint of chemical industry, are the valuable comparisons between the activity of pyrethrum, derris powder and DDT as an insecticide in a particular field in the Belgian Congo (P. C. Lefevre) and a chemical evaluation of pyrethrum flowers designed to establish an international standard (H. E. Coomber, Imperial Institute).

* * *

A factor capable of having an important bearing on a subject of urgent interest, increased production of steel, is the subject of an expert description with illustrations, "The Temperature Measurement of Liquid Steel," in a folder issued by Tinsley (Industrial Instruments), Ltd. This briefly summarises the need for accurate measurement and the means adopted in the past, leading to the wide adoption of the platinum-platinum-rhodium thermocouple. This, lightly sheathed in silica, is capable of being plunged into liquid steel with a slag cover and withdrawn intact, providing an accurate temperature reading. On this principle is based the present installation produced by Tinsley, which, with the use of an amplifier, enables an accurate record ($\pm 2^\circ\text{C}.$) to be kept on large indicators at the furnace and on office recorder charts.

* * *

The use of stainless steel in the chemical and food-processing industries is adequately dealt with in an informative and well-illustrated article by Mr. J. A. McWilliam in the first issue of *Murex Review*, published by Murex, Ltd., Rainham, Essex. Future issues of this publication, at quarterly intervals, will contain other articles of interest to users of the firm's products and would-be contributors are invited to submit suitable material for consideration.

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The Federated Metals Division of the American Smelting and Refining Company, 120 Broadway, New York 5, describes in a recent booklet properties and uses of its new aluminium alloy, Tenzaloy, containing 0.8 per cent copper, 0.8 per cent zinc, 0.4 per cent magnesium, and the balance aluminium. Its general characteristics are said to make it applicable where high strength and hardness in the "as cast" condition are desired. Its special features, of which 12 are described, are shown in figures and ageing curves when cast in sand and permanent moulds.

* * *

The Export Assistance Department of the National Union has prepared for its members a brochure for the guidance of those who contemplate entering the export trade for the first time or for those with little experience of overseas trade. The aim of the brochure is to direct the manufacturer to the sources of information regarding the many and varying aspects of the export trade rather than to provide a catalogue of circumstances which obtain at the moment.

The subjects dealt with include considerations of suitability of goods for various markets, how to sell the goods, the appointment of agents overseas, functions of merchants and agencies in this country, arrangements for payments, shipping, forwarding and insurance, the operation of the Export Promotion Department and Export Credits Guarantee Department, co-operation with other manufacturers, market research and advertising.

The brochure, in a limited edition, costs 10s.

Polyethylene Glycols

A recent development that has been translated to works production now makes available in commercial quantities a number of chemical esters, of an oily character, that dissolve clearly in water.

Chemically these products are polyoxyethylene oleates and laurates having a molecular weight above 800. They are non-ionic, non-toxic, light in colour and fluid or grease-like in consistency. They dissolve clearly in water, alcohol, esters, hydrocarbons and vegetable oils. At $20^\circ\text{C}.$ they are slightly heavier than water. They all have high boiling points and exhibit surface-active properties. They are now being produced and sold by the Glyco Products Co., Inc., Brooklyn, N.Y.

PERSONAL

MR. DAVID JOHN GARRETT, iron manufacturer, Benvue, Biggar, Lanarkshire, formerly of Coatbridge, left £19,964.

MR. HARRY GREENWOOD, a director of Dunn Bros., Successors, Ltd., manufacturers of chemicals and coal-tar products, of Manchester, left £11,455 (net £11,389).

Audley Engineering Co., Ltd., Newport, Shropshire, announces that MESSRS. P. MEREDITH and J. W. TAYLOR have been appointed additional directors of the company.

MESSRS. W. A. ROBINSON and J. H. BAIRSTOW, both of whom have served Midland Tar Distillers, Ltd., Birmingham, for many years, have been appointed directors.

MR. HOWARD S. CRUMP has been appointed manager of the Liverpool branch of Brightside Foundry & Engineering Co., Ltd., in succession to MR. W. CLARE, who is retiring after 42 years' service.

The Secretary of State for the Colonies has appointed to the Board of the Colonial Development Corporation LORD MILVERTON, who retired last year from the Colonial Service, in which he had served for 40 years.

The University of Glasgow has awarded the Coats Fellowship, of the annual value of £300, tenable for two years, to MR. PATRICK A. ONGLEY, a graduate in Arts and Science, of New Zealand, who is a research student in chemistry at the University. This is the first award of the Fellowship recently instituted by Messrs. J. and P. Coats, Ltd., thread manufacturers, Paisley.

MR. W. J. MORRIS, research assistant in the physics department at Manchester Oil Refinery, Ltd., has been awarded the degree of M.Sc. for a thesis on "Jet Viscometers for High Rates of Shear." Another MOR recipient of the same degree is MR. W. F. MADDAWS, also of the physics department, for a thesis on the ultra-violet absorption spectrophotometric method for analysis of hydrocarbon mixtures.

MR. ASHLEY S. WARD, for many years chairman of Thos. Smith & Sons (Rodley), Ltd., crane and excavator makers, Leeds, has retired from the board. MR. F. H. SMITH also has relinquished his position as joint managing director, but remains on

the board in an advisory capacity. New appointments are: Chairman and managing director, MR. F. R. STAGG; joint managing director, MR. W. H. SHARP; assistant managing director, MR. T. N. F. SMITH.

LEVERHULME RESEARCH AWARDS

The following names appear in the list of recipients of Leverhulme Research Fellowships, tenable for periods up to two years: J. EWLES, senior lecturer in physics, the University, Leeds—The luminescence of solids and of substances adsorbed on solids; J. C. ROBERTS, lecturer in chemistry, University College, Nottingham—The chemistry and bio-chemistry of moulds; E. B. MAXTED, special lecturer in catalysis, University of Bristol—Studies in catalyst poisoning.

OBITUARY

DR. FRANCIS W. GRAY, former lecturer in chemistry at Aberdeen University, died last week. A notable research worker and the author of a number of scientific publications, Dr. Gray retired from the University staff 12 years ago owing to ill-health.

New BWRA Council

At the annual general meeting last week of the British Welding Research Association, the following were re-elected members of council: MR. A. J. BOYD, Metropolitan-Cammell Carriage & Wagon Co., Ltd.; MR. H. W. CLARKE, James Booth & Co., Ltd.; SIR ANDREW McCANCE, Colvilles, Ltd.; DR. J. H. PATERSON, Arc Manufacturing Co., Ltd.; MR. C. M. SPIELMAN, Whessoe, Ltd. COMMANDER SIR ROBERT MICKLEM and MR. V. E. GREENWOOD, who retired, were cordially thanked for their services and the following were elected new members of the council: MR. L. P. LORD, MR. F. C. MANNOX, MR. J. A. ORIEL, VICE-ADMIRAL SIR CHARLES SIMMONS, MR. J. H. N. THOMPSON.

B.I.F. Bookings.—August 7 is the closing date for the receipt of applications for space at the 1949 B.I.F. (May 2-13), request for which shows signs already of considerably exceeding this or the preceeding year's records.

Parliamentary Topics

INSISTENCE by the Opposition that consumers should have free choice of electricity or gas, resulting in a vote against the Government, marked the third reading of the Gas Bill in the House of Lords. A clause to procure that option for the user was moved by Lord Rennell. Lord Lucas, for the sponsors of the Bill, said there was no provision to restrict the user's freedom, although there might be circumstances in which the Minister would see fit to issue directions for a small local gasworks that had become redundant to be closed down.

Viscount Swinton said it was a thoroughly bad case. The grandmotherly and universal interference with the way in which people wished to conduct their business, let alone occupy themselves in their own homes, had got beyond a joke. It was becoming an all-pervading menace. The claim that the Government should dictate what kind of fuel was to be used was intolerable.—The new clause was carried by 51 votes to 14.

Use of German Patents.—Asked by Mr. R. R. Stokes whether German patent rights were still protected outside Germany, and what notice has been taken of their value when assessing reparations from Germany the Under Secretary of State for Foreign Affairs (Mr. C. P. Mayhew) said: German patent rights in existence abroad on August 1, 1946, were German external assets to be liquidated in accordance with the terms of the Paris Conference on Reparation. The London Patents Accord of July 27, 1946, to which 28 nations were party, placed the majority of these patents in the public domain or made them available for royalty-free licensing, subject to certain exceptions. German inventions made after December 31, 1945, could be patented in the United Kingdom, United States and France and receive normal protection. Mr. Stokes further asked if the Under Secretary was aware that there had been a general stealing of design patents, with no regard paid to the value to the people from whom they have been stolen, just as in the case of the Kalibri works, when tools were taken away and had to be returned because they had been stolen by competitors in this country." Mr. Mayhew said that the Kalibri works case had nothing whatsoever to do with the question.

Reduced Supplies of Sodium Chlorate.—Asked if he was aware that farmers were unable to obtain sodium chlorate for killing weeds, and what steps he was taking to make supplies available, Mr. J. Belcher said it

had not been possible so far this year to secure in full the imports of sodium chlorate which normally supplemented home production, but he was hopeful of an early improvement in this respect. Meanwhile, on the advice of the Minister of Agriculture, he was arranging for as much sodium chlorate as possible to be reserved for the destruction of potato haulms and for weed killing on farm land. More would become available for the latter purpose as the demand for use on the potato crop diminished. Asked what increase had taken place in the production of sodium compounds, particularly soda ash, since the beginning of this year, Mr. Belcher said that there had been an increase of 6 per cent in the output of soda ash since January 1, 1948.

Groundnuts Scheme.—During a debate on food subsidies on Monday, Mr. J. Strachey, Minister of Food, said that while he could not forecast the costs of the groundnuts scheme or future groundnuts prices, both would be considerably higher than previous estimates. It was originally planned to produce groundnuts at £30 a ton for the first three years, dropping to £20. To-day, for certain marginal quantities, the Government was paying between £65 and £70. Main supplies, from Nigeria, were costing £41 per ton. The scheme would be producing commercial quantities next spring or early summer.

Malayan Rubber and Tin.—Owing largely to the fine efforts of the planters and small-holders in Malaya, the physical recovery of the rubber industry from the effects of the war is now virtually complete said Mr. Rees-Williams, Secretary of State for the Colonies. Production in 1947 was nearly 100,000 tons above the 1940 level. Satisfactory progress had also been made in rehabilitating the tin industry, but physical damage inflicted by the Japanese and shortage of steel and of electrical machinery had caused delay. All the hydraulic mines were working and 65 of the 100 dredges in use before the war were operating. The tin industry would receive the highest possible priority with regard to steel.

Coal Board's First Year.—The results of the first year's working of the National Coal Board were announced on Tuesday. The figures read: Tons sold 184,748,211; receipts £371,836,736; costs £381,040,641. Coal cost 41s. 3d. per ton to produce and sold at 40s. 3d. resulting in an average working loss of 1s. per ton totalling £9,203,905 for the year.

Home News Items

Shetland Peat Research.—Dr. N. W. Radforth, a Canadian scientist, is investigating peat deposits in Shetland on behalf of the National Research Council of Canada and other Canadian scientific interests.

Training for Engineers.—A new apprenticeship scheme, initiated by the Ministry of Supply, provides for the training of young graduate engineers who will be given essential practical experience for two years before entering specialised fields. After his course the apprentice may apply for entry to the Ministry's engineering pool or transfer to a commercial organisation.

International Road Federation.—The British Road Federation has become a founder member of the International Road Federation (European and Eastern Region), which was formed on June 25 when the Steering Committee, consisting of delegates of the road federations of France, Holland, Sweden, Switzerland and Great Britain, held a meeting in Paris. The new body will have its headquarters in London.

£160,000 More for Herring-Oil Project.—Announcement of a further grant of £160,000 in the Supplementary Civil Estimates, making £285,000 for herring-oil production plans, recognises the importance of this project in the Government plans and the determination to follow it to a successful finish. It is stated that the scope of the operations is to be largely expanded this year.

Unsettling Effect of P.T.—The Chancellor of the Exchequer is being asked by the National Union of Manufacturers that the new powers under the Finance Bill to vary purchase tax at any time by an Order shall not be used without consultation with the industry concerned. Retailers, it is pointed out, are unwilling under conditions of uncertainty to carry stocks of normal dimensions and the same conditions complicate the task of settling manufacturing programmes.

Import Regulations Listed.—The Board of Trade announces that a new consolidated list of import restrictions has been issued. This incorporates all amendments made to the former list which was issued in March, 1947, in so far as they are still operative. It is the Control of Imports into the United Kingdom, Notice to Importers No. 292 and is obtainable from the Import Licensing Department, Board of Trade, 189 Regent Street, W.1.

Record Steel Output.—Output of steel in June, announced the Iron and Steel Federation on Monday, was equal to a rate of 15,444,000 tons per annum and is the highest achieved in the history of the industry. For the six months ended June 30 aggregate production totalled 7,564,000 tons, indicating an annual rate of 15,128,000 tons—well above the Government's higher target figure of 14.5 million tons.

Royal Visit to Colour Council.—Princess Elizabeth visited the headquarters of the British Colour Council, Portman Square, W.1., on July 7. The Princess displayed great interest in the various services undertaken by the council on behalf of British industry, including overseas markets research, and also saw preparations being made for the forthcoming exhibition of fashion colours.

U.S. Verdict.—A Scottish chemical exporter states that a U.S. client, writing after a recent visit to the U.K. and the Continent, says: "It was extremely surprising to me to find conditions on my trip to the Continent so much better than prevailed in England and Scotland, and, while it is apparently none of my business, it does seem to me that your system of regulations and restrictions on free enterprise is the wrong method of solving your post-war difficulties."

Pigment Firm's Jubilee.—Nearly 2000, consisting of employees, their wives and children, took part in celebrations held at Widnes on July 3 marking the 50th anniversary of the founding of Orr's Zinc White, a subsidiary of the Imperial Smelting Corporation. Presentations were made to 154 long-service employees, many of whom had been with the firm for more than 40 years. The company was incorporated on July 18, 1898, by Mr. John B. Orr, creator of Lithophone.

Private Imports of Tung Oil.—The Board of Trade announces that, as all Government stocks of tung oil have now been sold, full private trading is to be restored. Hitherto, traders have had to take one ton of Government stock for each two tons privately imported. Applications for import licences should be made as in the past to Import Licensing Branch, 189 Regent Street, London, W.1. The Board points out that the Control of Drying Oils (No. 1.) Order 1942 remains in force, however, and all who wish to acquire or use tung oil must be in possession of a licence under this order.

Overseas News Items

Fireworks Disaster.—Nine workers were killed and six others badly injured when a fireworks factory at Oberarth (central Switzerland) blew up on July 8. The factory's 15 workers were mostly women.

German Pyrites Supplies.—Production of pyrites in the British and U.S. zones of Germany is to be increased to about 360,000 tons this year to meet partially an essential total requirement of 930,000 tons. The deficiency will be made up by imports.

Increased Fertiliser Consumption.—The U.S. National Fertiliser Association states that American farmers used over 15 million tons of chemical fertilisers last year, compared with an annual average of 7.3 million tons during the years 1935-1939.

New U.S. Sulphur Mine.—Production has started at the Texas Gulf Sulphur Company's new mine near the Trinity River in Liberty County, Texas. Following 95 hours of steaming, the mine suddenly went into production. The new operation is the fourth Texas sulphur mine to be developed by the company since 1918.

S. African Chrome Mining.—A new development in the South African chrome mining industry is the recent amalgamation of the chrome interests of the Union Corporation and the African Mining and Trust Co., (Pty.). The new company will have available all the ores and concentrates produced in the Rustenburg and Lydenburg chrome mining areas.

Canadian Alcohol.—Mr. C. G. Kertland, president of Commercial Alcohols, Ltd., told shareholders of the company at the annual meeting here that its £2.5 million alcohol plant at Gatineau, Quebec, should be in operation this Autumn. Erecting costs would probably have increased 10 per cent. The company is also proceeding with the construction of its magnesia insulation plant, to operate next February or March.

Malaya Repeals Tin Duty.—In accordance with an agreement signed at Geneva last year, the duty of \$30 per picul on Malayan tin ore, to other than Empire smelters, has been repealed as from July 31. It will then be possible for U.S. buyers to compete for the ore. Traders are asking how the removal of the duty will be reconciled with the allocations of the International Tin Committee and the Ministry of Supply's fixed buying price, which remains in force until June 1949.

Re-Named.—The American Foundrymen's Association, 52-year-old technical organisation of the castings industry, has decided to change its name to American Foundrymen's Society.

New Canadian Refinery.—Officials of the Imperial Oil Company announce that a new refinery at Edmonton has completed a satisfactory test run of its oil processing unit. Present planned output is 6000 barrels daily to be increased later to 11,000 barrels.

Montecatini Fertilisers.—The Montecatini Company has inaugurated a new large factory at Assisi for the production of sulphuric acid and chemical fertilisers. New plants have been built on the site of the old ones, destroyed in 1944, at a cost of 400 million lire.

Opportunity for U.K. Chemicals.—In the absence of the pre-war German supplies, the demand in Belgium for all fine chemicals, dyes, insecticides and pharmaceuticals has enormously increased. Manufacturers have not been slow to capture a share of this trade and in recent months the chemical group has held third or fourth place in the list of United Kingdom exports to Belgium—*Board of Trade Journal*.

German Oil Production Increasing.—German oil production in March aggregated 50,673 tons, compared with 46,173 tons in February. It is hoped to reach an annual output of crude oil of about 600,000 tons this year. Preparatory work in the Adorf oilfield in the Elmsland district of north-western Germany is stated to have proceeded so well that it will be possible to start production very soon.

Germany to Export Cement.—The Hanover Portland Cement factory Teutonia A.G. has obtained permission to manufacture cement for export. The works are at present running at 40 per cent of pre-war capacity, about 10,000 metric tons monthly. The output is to go, in the main, to Latin American countries. This is the first of the four cement factories located near Hanover to have resumed output.

Canada's Chemical Imports.—Imports into Canada of chemicals and allied products rose from \$26.3 million in the same period of 1947 to \$28.3 million, this year, according to the official survey of Canadian imports in the first three months of 1948. Proportionately the largest increases were in imports of iron and products (to \$187.5 million) and non-metallic minerals and products (to \$113.6 million).

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

BRITISH ELECTRONIC APPLIANCES LTD. London, N.W. (M.17/7/48). June 7, £10,000 debts.; general charge.

GULA - KALUMPONG RUBBER ESTATES LTD. London, E.C. (M.17/7/48). June 9, charge, to Industrial Rehabilitation Finance Board, Selangor, Malaya, securing all sums which the charges may be called upon to pay under or by reason of a guarantee; charged on property known as Sungei Tawar Estate, Kuala Ketil. *Nil. October 2, 1947.

Satisfaction

BAIRD & TATLOCK (LONDON) LTD. chemists. (M.S.17/7/48). Satisfaction June 4, £2000, registered January 16, 1940.

Company News

Reckitt & Colman, Ltd. reports a trading profit for the year ended December 31, 1947, of £3,275,230 compared with £3,201,012 for 1946. A dividend of 20 per cent. is being recommended.

Sheepbridge Coal and Iron Co. shareholders have approved the proposal to change the company's name to Sheepbridge Company as it was considered the old title was no longer appropriate in view of the nationalisation of the coal industry.

The nominal capital of **Refinery (Holdings), Ltd.**, River Plate House, London, E.C.2, has been increased beyond the registered capital of £100 by £549,900, in 300,000 5½ per cent redeemable cumulative preference shares of £1 and 999,600 ordinary shares of 5s.

The Scottish chemical and scientific instrument firm of **Thomson, Skinner and Hamilton, Ltd.**, Sauchiehall Street, Glasgow, has been re-registered as a public limited company with a capital of £200,000. The directors are Messrs, Henry C. Lynton, William H. Lancaster, Robert W. Stewart and Charles Barclay, C.A.

The nominal capital of **Laboratory Supplies, Ltd.** 15 Central Chambers, Ealing Broadway, London, W.5, has been increased beyond the registered capital of £100 by £2900, in £1 ordinary shares.

New Companies Registered

Watts Chemicals, Ltd. (456,735).—Private company. Capital £10,000. Manufacturers exporters and importers of chemicals, drugs, medicines, etc. Solicitors: Buckeridge & Braune, 3/4 Clements Inn, W.C.2.

Solsway Plastic Laboratories, Ltd. (456,507).—Private company. Capital £10,000 Directors: H. Leigh and Frederic A. Axe, 108 Raleigh Drive, Friar Barnet, N.20. Reg. office: 8 Lytton Close, Alderney Gardens, Northolt, Middx.

A. S. Glues, Ltd. (456,748).—Private company. Capital £200. Manufacturers of chemicals, gases, glues, gums, etc. Directors: W. Smith, E. Smith. Registered office: "The Cullins," Leicester Road, Thurcaston, Leics.

Wrights Chemical Co., Ltd. (456,744).—Private company. Capital £100. Manufacturers of chemicals, disinfectants, fertilisers, salts, acids, etc. Directors: Wm. F. T. Wright, Sidney S. Pollard, Mrs Zillah Wright. Registered office: 90 Eden Street, Kingston-on-Thames, Surrey.

Bruno Court, Ltd. (456,373).—Private company. Capital £1000. Manufacturers of, and dealers in, essential oils, synthetic aromatics, essences, etc. Directors: Marie E. Bouge, Grasse, France; Philip T. Petley, London; Louis de Chauvigny, Touraine, France; and Lawrence V. Smith, Little Covert, Old Coulsdon, Surrey. Reg. office: 57 New Bond Street, W.1.

Chemical and Allied Stocks and Shares

BUSINESS in stock markets remained on a very limited scale, with small irregular movements in most sections. Last week's big withdrawals from National Savings affected sentiment in the gilt-edged market, where the Nationalisation stocks lost ground under the influence of the loss revealed by the National Coal Board accounts. Reports of a pending increase in the price of high grade coal used mainly by industry had an adverse influence on industrial shares, particularly as this will hit the export drive by stepping up production costs in the home market.

Chemical and kindred shares moved narrowly, with Imperial Chemical 46s.

pending the new issue terms; Monsanto Chemicals 5s. ordinary were 57s. 6d., Laporte Chemicals 5s. ordinary 20s., Amber Chemical 2s. shares 9s. 6d., and Albright & Wilson changed hands around 28s. In other directions, business in Fisons was around 57s. 6d., Burt Boulton & Heywood were 26s. 3d., but De La Rue receded further to 39s. Among other shares connected with plastics, British Industrial 2s. ordinary were 6s. 6d., and British Xylonite £5.

Borax Consolidated at 56s. 3d. regained part of an earlier decline, British Aluminium were 47s. 6d., and British Oxygen have come back to 95s., but Courtaulds firmed up to 37s. 7½d. after an earlier decline. In the building and allied groups, British Plaster Board (23s. 3d.) have strengthened on the strong position disclosed by the accounts. Uncertainty still persisting whether the Government will agree to re-opening the London Metal Exchange caused a partial reaction in shares of metal-dealing companies, although Amalgamated Metal, at 19s. 3d., were higher on balance, as were Metal Traders at 45s. Associated Cement firmed up to 73s. 3d., but Lewis Berger at £7½ lost part of an earlier rise. Units of the Distillers Co. have been steady at 25s. 10½d., with Turner & Newall firm at 74s., and United Molasses 46s. 4½d.

Iron and steels eased a few pence although it is generally believed in the City that any fair basis of compensation in the event of nationalisation would have to be above current market prices. In most cases the latter show generous yields on the basis of last year's dividends, and with steel production now at its record level, earnings are probably running well above last year's dividend rates. There is, of course, little prospect of higher distributions while the dividend limitation rule persists. It is being generally assumed that in any case nationalisation cannot be effected for at least two years. United steel were 27s. 6d., Dorman Long 29s. 6d., Colvilles 33s. 7½d., and Richard Thomas & Baldwins 6s. 8d. units changed hands around 13s. 7½d. In other directions, Babcock & Wilcox receded to 63s. 9d.

Glaxo Laboratories became steadier at £15½, Staveley Coal & Iron were firm at 73s. 9d. on the market view that there are prospects of a partial return of capital to shareholders in the future, unless the company is planning further substantial acquisitions in the chemical industry. Triplex Glass 10s. ordinary units strengthened to 23s. 3d. on latest news of the company's products, including "curved" safety glass; but it is recognised in the market that dividend limitation will keep the dividend down

to last year's 10 per cent. Oil shares were dull on the view that if the United States were to impose sanctions against the Arab countries the latter might cancel oil concessions. Anglo-Iranian eased to £2½, Shell were 77s. 6d., and Burmah Oil 67s. 6d.

British Chemical Prices

Market Reports

A FIRM tone continues to be displayed in all sections of the chemicals market and buying interest has been sustained both for home trade and export. Deliveries under existing contract commitments are being called for in good volumes and in most cases requirements are being met with promptness though the supply position has not shown any noticeable improvement. Soda ash, bichromate of soda and chlorate of soda are in strong request and other items in the soda products section are being taken up to the full extent of the quantities on offer. The potash chemicals are finding a ready outlet at firm rates. Formaldehyde is a good market while a steady business has been done in practically all other items with nothing of outstanding interest to report. Pitch is again a good feature in the coal-tar products market and the creosote oils are enjoying a good demand and the overall position remains unchanged.

MANCHESTER.—In spite of seasonal holiday influences, steady trading conditions have been reported on the Manchester chemical market during the week. Textile chemicals are going forward in good quantities and a steady call for supplies against existing commitments is being dealt with from other industrial outlets. This applies both to light and medium products. Replacement business on home trade account during the past few days has been of fair extent and there has been no apparent easing in the flow of inquiries from shippers. The market is firm in pretty well all sections. In the tar products, a steady movement of supplies of creosote oil, carbolic acid and the light materials is reported.

GLASGOW.—Quiet conditions prevailed, due to the commencement of the Scottish holiday periods. Conditions are likely to remain quiet until next month, when the annual difficulty will arise of maintaining supplies when English suppliers are closed. In the export market conditions are fairly normal, a few orders again having been received. Generally, sales are on a scale smaller than at the same time of the year in previous years. There are definite signs of a shortage of money.

Johnson, Matthey and Co.

Value of Research

THE widening resources in the sphere of precious metals in the U.K., the U.S.A., Canada and, most recently, in Australia of Johnson, Matthey & Co., Ltd., were ably surveyed by the chairman, Mr. Hay W. P. Matthey, at the annual meeting of the company in London last week. Mr. Matthey, who lately completed 50 years service as a director, recalled that value of export sales in 1946 was $4\frac{1}{2}$ times larger than the highest pre-war total: last year the total was seven times as great as that pre-war figure, in spite of currency restrictions, which were coming to be regarded as inevitable and permanent. He referred to the great technical advances he had seen during his long directorship, culminating in their present-day ability to refine platinum to 99.99 per cent purity and to roll and draw a billet weighing several pounds to an almost invisible wire .00025 in. in diameter. The company's intensive research into the dormant properties of precious metals had aided their greatly increased use in industry. As a result, silver, for example, had become an essential material for chemical plant, photographic emulsions, electrical contacts and condensers and many other products. The continued interchange of opinions between their research and production specialists had resulted in a steady flow of new products and processes.

The declaration of a final ordinary dividend of 3 per cent and a bonus of 6 per cent, making 12 per cent for the year, was approved.

£A25 Million for Science

INSTALLATION of a cyclotron at Melbourne is now being considered by the Australian Government as part of its defence plans, according to the Australian News and Information Bureau in New York. Mr. John J. Dedman, Minister of Defence, said that atomic research was only one of many defence proposals now being considered by the Federal Government in close co-operation with Great Britain. It is reported that approximately £A200 million has been allocated for a five-year defence programme, of which more than £A25 million would be devoted to scientific research. A big proportion of this would be spent on the Australian rocket range, and the balance used on defence activities which are still in the "top secret" category.

Big Buyers Arrive

EVIDENCE of good prospects of increased transatlantic sales of U.K. chemicals, machinery and other goods was offered by several of the passengers who arrived at Liverpool on the *Empress of Canada* on July 10. Mr. Herbert H. Lank, vice-president of the sales department of Canadian Industries, Ltd., let it be known that he wanted chemicals, of many categories, in very large quantities. He was dressed almost entirely in nylon, his outfit including Canada's first nylon raincoat, weighing 5 oz. Other arrivals included Mr. George P. Granell, of Toronto, who is prepared to spend \$1 million on steel and rolling mill machinery; Mr. Keith Jopson, Britain's senior trade commissioner in Montreal and economic adviser to the High Commissioner, who said the Canadian Government urgently wants more Lancashire textiles; and Mr. Frederic Warren, president of the Canadian Chamber of Commerce in Britain, returning from the Toronto Fair, who said there is a great desire to buy British, "the only complaint being high prices."

New Rayon Research Centre

A PORTION of a former aircraft factory at Barton, near Manchester, is shortly to be converted into temporary laboratories by the British Rayon Research Association.

An official of the association said last week that it was hoped later to secure permanent premises on the south side of Manchester, but accommodation difficulties had prompted part-tenancy of the factory as a temporary measure.

The establishment of a research centre coincides with the 50th anniversary of the commercial marketing of rayon in Britain. Since 1930, British rayon production has grown from 48 million to more than 200 million lb., and the value of British rayon exports to-day approaches £30 million.

NEXT WEEK'S EVENTS

TUESDAY, JULY 20 to THURSDAY, JULY 22

Institution of Electronics (North West Branch). College of Technology, Manchester. Third annual exhibition.

WEDNESDAY, JULY 21

British Standards Institution. Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C.2, 3.0 p.m. Annual general meeting.

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2, at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Process for separating by liquefaction gaseous mixtures into their constituents.—Air Liquide, Soc. Anon. pour L'Etude et L'Exploitation des Procédés G. Claude. Dec. 19, 1940. 603,249.

Process of manufacture of glycol.—Solvay & Cie. Dec. 24, 1942. 603,256.

Vat dyestuffs of the anthraquinone series.—I.C.I., Ltd., F. Irving, and A. Livingston. Oct. 18, 1945. 603,317.

Manufacture of acyloxy-carboxylic acids.—Howards & Sons, Ltd., R. H. Lock, and R. Heap. Oct. 22, 1945. 603,189.

Oil phase polymerisation.—United States Rubber Co. Dec. 30, 1944. 603,324.

Oil phase polymerisation.—United States Rubber Co. Dec. 30, 1944. 603,325.

Production of holes in sintered powdered metal articles.—London Electric Wire Co. & Smith, Ltd., A. Kelly, and A. B. Ashton. Nov. 15, 1945. 603,123.

Manufacture of articles from polymers or copolymers of vinyl chloride.—Soc. Rhodi-aceta. Aug. 4, 1944. 603,040.

Method of charging vertical blast holes with liquid oxygen explosives.—Air Liquide, Soc. Anon. pour L'Etude et L'Exploitation des Procédés G. Claude. Nov. 6, 1944. 603,045.

Method for the removal of solid carbonaceous deposits.—Air Liquide, Soc. Anon. pour L'Etude et L'Exploitation des Procédés G. Claude. Nov. 8, 1944. 603,046.

Centrifugal speed governors for electric motors.—Air Liquide, Soc. Anon. pour L'Etude et L'Exploitation des Procédés G. Claude. Dec. 14, 1944. 603,047.

Manufacture of stilbene dyestuffs and of starting materials therefore.—J. R. Geigy, A.G. Nov. 24, 1944. 603,267.

Process of preparing chlorites from chlorine dioxide.—N.V. Koninklijke Nederlandse Zoutindustrie. Dec. 31, 1942. 603,338.

Process for making selenium dioxide.—E. P. Newton. Dec. 11, 1945. 603,133.

Method of preparing an anti-hemorrhagic preparation.—Abbott Laboratories. Dec. 29, 1944. 603,206.

Production of morpholine salts of sulphonated azo dye components.—Marconi's Wireless Telegraph Co., Ltd. Dec. 21, 1944. 603,280.

Production of organic nitro compounds.—E. I. Du Pont de Nemours & Co. Dec. 22, 1944. 603,344.

Manufacture of biguanide derivatives.—I.C.I., Ltd., S. Birtwell, A. F. Crowther,

F. H. S. Curd, J. A. Henry, D. N. Richardson, and F. L. Rose. Jan. 7, 1946. 603,069.

Manufacture of biguanide derivatives.—I.C.I., Ltd., A. F. Crowther, F. H. S. Curd, J. A. Hendry, and F. L. Rose. Jan. 25, 1946. 603,070.

Centrifugal pumps. Tecalemit, Ltd., and C. C. S. Le Clair. Jan. 28, 1946. 603,071.

Manufacture of wax articles.—Metropolitan-Vickers Electrical Co., Ltd., and J. S. Turnbull. March 5, 1946. 603,072.

Degassing of metals or metal alloys.—Foundry Services, Ltd., and K. Strauss. July 24, 1945. 603,213.

Arc carbon anodes.—Soc. le Carbone-Lorraine. Dec. 12, 1938. 603,564.

Rotors for compressors, turbines and the like.—Power Jets (Research & Development), Ltd., and L. T. Whitehead. March 8, 1945. 603,578.

Lactones of 2-methyl-3-hydroxy (and alkoxy)-4-carboxy-5-hydroxymethyl - pyridine.—Merck & Co., Inc. May 27, 1944. 603,442.

Method and apparatus for the production of pulp from cellulosic material.—J. B. Beveridge, and R. D. Kehoe. Jan. 26, 1942. 603,447.

Apparatus for utilisation of medicinal aerosols.—Soc. Anon. Teco. Oct. 4, 1941. 603,455.

Process of extracting iron from iron silicates or iron ores containing silica.—Orkla Grube-A. June 17, 1943. 603,366.

Production of light density polymeric materials.—Expanded Rubber Co., Ltd., and S. Booth. Oct. 19, 1945. 603,402.

Process for the hydrolysis of 2, 5-dihydrofurans.—I.C.I., Ltd., and D. G. Jones. Oct. 22, 1945. 603,422.

Treatment of gases or vapours with liquids.—I.C.I., Ltd., and O. G. Dixon. Oct. 22, 1945. 603,423.

Method for making anthrimides.—E. I. Du Pont de Nemours & Co., J. M. Tinker, and O. Stallmann. Oct. 22, 1945. 603,495.

Process for manufacturing pentaphthraquione-tetracarbazole.—E. I. Du Pont de Nemours & Co., J. M. Tinker, O. Stallmann, and P. J. Wingate. Oct. 22, 1945. 603,496.

Concentration of ethylbenzene.—Distillers Co., Ltd., and F. E. Salt. Oct. 22, 1945. 603,497.

Chloro-ethylation of alkylated benzene compounds.—Distillers Co., Ltd., E. G. Galitzenstein, F. E. Salt, H. M. Stanley, and T. Weir. Oct. 22, 1945. 603,498.

Manufacture of soap from sperm oil.—A. Abbey. (Compania Industrial Soc. Anon.) Oct. 23, 1945. 603,529.

Method of and means for condensing corrosive vapours.—Soc. Pour L'Exploitation des Procédés Ab-Der-Halden. April 24, 1942. 603,598.

Process for the manufacture of acridine compounds.—E. P. Newton. (Parke, Davis & Co.) Oct. 23, 1945. 603,533.

Removal of impurities from water or aqueous liquids.—Permutit Co., Ltd. (Permutit Co.) Oct. 23, 1945. 603,534.

Process for the manufacture of an imidazolidone derivative.—F. Hoffmann-La Roche & Co., A.G. Nov. 20, 1944. 603,536.

Process for the manufacture of 1-d-ribitylamino-3,4-xylo. F. Hoffmann-La Roche & Co., A.G. Nov. 24, 1944. 603,537.

Oil phase polymerisation.—United States Rubber Co. Dec. 30, 1944. 603,546.

Manufacture of laminated products.—Bakelite, Ltd. Nov. 2, 1944. 603,562.

Production of aryl trihalogenoethanes.—Geigy Co., Ltd., I. E. Balaban, and F. K. Sutcliffe. Oct. 29, 1945. 603,685.

Production of vinyl cyanide.—I.C.I., Ltd. Oct. 27, 1944. 603,699.

Production of vinyl cyanide.—I.C.I., Ltd. Oct. 27, 1944. 603,700.

Manufacture of derivatives of di-substituted methane compounds.—Ward, Blenkinsop & Co., Ltd., and G. J. Pritchard. Oct. 30, 1945. 603,616.

Preparation and use of substituted methane compounds.—Ward Blenkinsop & Co., Ltd., and G. J. Pritchard. Oct. 30, 1945. 603,463.

Production of vinyl ethers and their homologues.—Distillers Co., Ltd., P. L. Bramwyche, and M. Mugdan. Dec. 12, 1945. 603,471.

Process for sensitising rubber latex.—F. Chassaing. Jan. 9, 1945. 603,628.

Method of bonding rubber and synthetic rubber to metal.—Firestone Tyre & Rubber Co. Dec. 18, 1944. 603,631.

Interpolymers.—E. I. Du Pont de Nemours & Co. Jan. 31, 1945. 603,481.

Interpolymers.—E. I. Du Pont de Nemours & Co. Jan. 31, 1945. 603,482.

Manufacture of polymethine dyes and photographic emulsions containing the same.—Kodak, Ltd. (Eastman Kodak Co., L. G. S. Brooker, and F. L. White.) Aug. 28, 1944. 603,492.

Process for recovering magnesium salts.—Idaho Maryland Mines Corporation. Oct. 23, 1942. 603,779.

Separating dust from gases.—British Filtrators, Ltd., and T. C. Worth. Oct. 19, 1943. 603,704.

Manufacture of heat and sound insulating masses composed of foam built up on a basis of artificial resin.—Ciba, Ltd. July 28, 1944. 603,790.

Process for the simultaneous manufacture of bicarbonate of magnesium and of ammo-

nium magnesium phosphate.—C. d'. Asseev. Jan. 12, 1944. 623,794.

Drying of hydrous oxide gel particles.—J. C. Arnold. (Standard Oil Development Co.) Sept. 14, 1945. 603,729.

Purification from compounds of sulphur, phosphorus and/or arsenic of gases inactive to chlorine.—Solvay & Cie. Dec. 18, 1943. 603,735.

Rolling mills.—I.C.I., Ltd., and S. S. Smith. Oct. 30, 1945. 603,752.

Azo dyestuffs.—I.C.I., Ltd., G. T. Douglas, A. Parkinson, and H. Wakefield. Oct. 30, 1945. 603,753.

High temperature elastic fluid turbines.—British Thomson-Houston Co., Ltd. (General Electric Co.) Oct. 30, 1945. 603,798.

Method of softening and de-aerating water, and particularly boiler water.—Produits Chimiques de Ribecourt. Nov. 21, 1944. 603,802.

Catalytic treatment of sulphur-bearing hydrocarbon distillates.—Shell Development Co. Dec. 21, 1944. 603,808.

Production of unsaturated halogenated hydrocarbons.—Shell Development Co. Dec. 19, 1944. 603,809.

Hydrolysis of acetone auto-condensation products.—Shell Development Co. Dec. 5, 1944. 603,810.

Process for the manufacture of quaternary pyridinium salts.—Roche Products, Ltd., F. Bergel, A. Cohen, J. W. Haworth, E. G. Hughes, and J. A. Silk. Oct. 30, 1945. 603,811.

Production of allyl alcohol.—Carbide & Carbon Chemicals Corporation. Jan. 16, 1945. 603,815.

Plasticised synthetic resin compositions.—Distillers Co., Ltd., D. Faulkner, H. M. Stanley, and J. J. P. Staudinger. Oct. 30, 1945. 603,817.

Manufacture of acetonitrile.—I.C.I., Ltd., and H. R. C. Pratt. Oct. 31, 1945. 603,823.

Manufacture of acetonitrile.—I.C.I., Ltd., and H. R. C. Pratt. Oct. 31, 1945. 603,824.

Hydrogenation of organic compounds.—E. I. Du Pont de Nemours & Co. Nov. 1, 1944. 603,825.

Production of fluorohydrocarbons.—I.C.I., Ltd. Nov. 1, 1944. 603,855.

Polyformals.—I.C.I., Ltd. Nov. 2, 1944. 603,872.

Compositions comprising acrylonitrile polymers and copolymers and shaped articles produced therefrom.—E. I. Du Pont de Nemours & Co. Nov. 4, 1944. 603,873.

Coloured cellulose ester and ether materials.—H. C. Olpin, and K. R. House. Nov. 2, 1945. 603,880.

Manufacture of interpolymers.—E. I. Du Pont de Nemours & Co. Nov. 7, 1944. 603,952.

The Chemical Age

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Help From America

THE unique gesture which the U.S.A. is making in defiance of all traditional mercantile usage to put the war-devastated nations of Europe on their feet is being widely applauded by all who see the Marshall Aid plan as essentially a utilitarian measure. As was to be expected, the plan has found also a very active body of critics, chiefly in those countries which have held aloof from its benefits and in which by common agreement it is represented as a commercial-imperialist plot. To these the most recent phase in the development of the rehabilitation scheme represented in this country by the proposed formation of an Anglo-American council to study the machinery and economics of industrial production here has become the focal point of a more concerted attack. Here, admittedly, the planners are on very much more controversial territory.

The industrial countries of the world are bound together by economic ties so close that, as experience has shown, the disappearance of one large industrial country from the economic map may upset the whole balance of world trade. The U.S.A. realises better than any other country that world trade can flow smoothly, and world peace be preserved, only if there is healthy industrial activity widely spread throughout all the established producing countries. To secure this the U.S.A. is prepared to spend money on an almost unparalleled scale. The first American loan was frittered away for reasons which we need not now discuss. It did little or nothing to

rehabilitate our industry. The same mistake must not be made a second time.

The Anglo-American Council on British Industry is designed to discuss whether there are ways and means by which particular industries in this country can derive benefit from co-operation with their opposite numbers in America. The proposal has been condemned in some quarters as a first-class blunder, not only because what suits American conditions will not necessarily be of any benefit here, but also because if advice is given and is not accepted the fact may be held to indicate that we are not making adequate use of Marshall Aid.

It is necessary that there should be clear thinking on this issue and equally clear recognition that much that is done by American industry is not possible here. Some, too, is wholly undesirable; the high level of inflation which has accompanied the payment of huge sums in wages in the pursuit of the largest scale of production is not a condition we want to emulate. Those who have recently been in the U.S.A. will know that in one respect that country and Britain are alike, namely, that in each country there are industrial concerns of the highest standard of efficiency and some with a very low standard, with the great majority lying between the two. A low-standard industry or undertaking in either country can learn from its opposite number in the other and even a highly efficient industry can learn something from an equally efficient counterpart in the other. There are already increasing

On Other Pages

Leader :	
<i>Help from America</i>	173
Notes and Comments :	
<i>Disaster</i>	175
<i>Export Contrasts</i>	175
<i>I. G. Farben Sentences</i>	175
<i>More Specialists</i>	176
<i>Sharing the Burden</i>	176
<i>Growth of New Scottish Chemical Enterprises</i>	176
<i>Rapid Plant Erection</i>	177
<i>Metallurgical Research Council</i>	178
<i>Control of Dyestuffs</i>	178
<i>Disaster at Ludwigshaven</i>	178
<i>Canadian Sodium Sulphate</i>	180
<i>Indian Petrol and Coal</i>	180
METALLURGICAL SECTION	
<i>Electrostatic Precipitators</i>	181

<i>Magnetic Filtration of Lubricating Oils</i>	182
<i>Davy-Faraday Exhibition in Paris</i>	183
<i>Advance of Powder Metallurgy</i>	185
<i>Electrolytic Deposition of Metal Powders</i>	186
<i>Gas Carburisation of Steel</i>	187
<i>Sweden to Produce 300,000 M. Units of Penicillin</i>	188
<i>Giant Pipe Bends</i>	189
<i>Record Belgian Output</i>	189
<i>Japanese Aluminium and Lead</i>	190
<i>Increasing Corrosion Resistance</i>	191
<i>South Africa's New Industries</i>	193
<i>American Chemical Notebook</i>	194
<i>Technical Publications</i>	195
<i>Parliamentary Topics</i>	196
<i>New Copal Plant</i>	201
<i>Company Meeting Report</i>	201

numbers of examples of co-operation between American firms and British firms, which is proving advantageous to both. It would, therefore, be obtuse in the extreme to suggest that the U.S.A. has nothing to teach us—or that we have nothing to teach them.

There has, however, been plenty of evidence that a practice which is admirable in one country cannot logically be applied to the other. The coal mining industry is an outstanding example. The scale upon which American operations are conducted makes mass-production easier to accomplish economically than in this country. There are good grounds for doubting whether mass-production methods are suited to our needs, except in certain specialised directions. It may be said broadly that mass-production is the characteristic feature of American industrial enterprise, whereas craftsmanship, quality and skill are the merits upon which most of the success of British industry has been founded. In theory, it sounds very promising to suggest that the two should be wedded together; in practice it happens to be generally true that when mass production is introduced the quality of the product suffers.

There may, however, be ways in which we can learn from the U.S.A. how to reduce costs by more economical use of

labour, without sacrificing quality. It is essential that any council that is set up should proceed with caution in framing its recommendations to that end. The conditions of work in many American industries would horrify the British trade unionists, regardless of the high wages paid. Only industrialists of the highest standing in the industries concerned are likely to gain a hearing. The Federation of British Industries has given qualified approval to the scheme, no doubt on the principle of trying anything once. From the viewpoint of the chemical industry, it appears very doubtful whether an advisory council of this sort will prove of much value. If it is felt that the U.S.A. has something to teach us in the way of production, the familiar principle of selected teams from this country visiting their parallel industries in America to see for themselves and to discuss the possibilities of applying to this country whatever they find to be good is already producing good results. In many branches of industry the exchanges of technique between the U.S.A. and ourselves are already large, friendly and hopeful. There is, too, great scope for discussion at higher levels, as, for example, in seeking to balance the terms of trade, of which the adverse effect now robs us of much of the benefit of recent increases of production.

NOTES AND COMMENTS

Disaster

PENDING the report of a court of inquiry which has studied the testimony of experts, the circumstances in which acres of one of Germany's largest chemical undertakings, the I. G. Farbenindustrie at Ludwigshaven in the French zone, were reduced to smouldering ruins, with the loss of more than 200 lives, remains an unexplained reminder of the possibilities of disaster inherent in some large-scale chemical processes. That fact is fortunately well recognised in this country, and that has undoubtedly helped in a very large measure to fend off the cataclysmic eruptions which have been known in the U.S.A. and most of the industrial countries of Europe. Preliminary reports point to a conflagration in the lacquer shops of the Badische Anilin Soda Fabrik as having been in effect the detonator which set off after a short interval the chain of great explosions in the neighbouring heavy chemical plants, where substantial quantities of nitrogen, paints and dyestuffs and sulphuric acid, among other things, must have added to the appalling tale of devastation. If any lesson is to be drawn in advance of the official findings, the siting of great, potentially explosive plants without the most ample fire-breaks is obviously to be avoided at all costs, even when, as in this case, the benefit of the Rhine waterway invited the construction of contiguous installations for several miles. In addition to the dreadful penalty in death and suffering, the reduction to chaos of so much of Germany's capacity for the production of much needed chemicals is a deplorable result.

Export Contrasts

CHEMICALS and drugs stand high in the list of U.K. industrial products which contributed to raise the volume of exports in the second quarter of this year to 184 per cent of the average figure in 1938, eight per cent more than was achieved in the three months January-March. The export percentage of chemicals and related materials during April-June of 1946 was appreciably larger than all except nine of the 26 main groups of which the record has now been published by the Board of Trade. All groups, excepting

vehicles and certain raw materials have yet to achieve varying percentage increases before attaining the export targets which have been set, and in this connection the chemical group has travelled farther than almost all others, being within eight per cent of that goal. Such progress entitles the most optimistic view to be taken of the prospects of reaching by the end of 1948 the monthly overseas sales total of £8.05 million. With export sales of a declared value of £20,992,000 in the April-June quarter, chemicals, drugs, dyes and colours are revealed as one of this country's most productive sources of revenue, yielding significantly almost exactly twice the return obtained from the revived export trade of the State coal industry.

I. G. Farben Sentences

FADING recollections have been revived of the detestation felt by all who were outside the Nazi-Fascist conspiracy for the great German chemicals and metals combine, I. G. Farbenindustrie. The reminder was provided by the announcement by the American tribunal in Nuremberg of sentences on 13 of the I. G. Farben principals, charged with theft of industrial property in the countries victimised by Nazi aggression and with the exploitation of slave labour. The comparative leniency of the sentences, ranging from 18 months to eight years and permitting the immediate release of Max Ilgner, Hans Kugler and some others who had already been in custody for periods longer than their sentences, seems to be a reflection of the more dispassionate view with which we can now regard the ruthless industrial machine which a few years ago threatened our very existence. Without the eager co-operation which I. G. Farbenindustrie offered, the Wehrmacht could not long have sustained its thrusts through the body of Europe, nor, in all probability, would the chief architect of destruction have been emboldened in his attempt to subjugate the world. The I. G. Farben leaders were extremely lucky that the impartiality of their accusers and judges permitted them to stand trial for offences against society on a smaller scale, and apparently gave them the benefit of the doubt whenever reasonable doubt existed. Thus passes into

history the most nearly successful attempt to conduct an industry with utter disregard of human values. Now that some of the chief conspirators have been punished, rational recommendations for a more productive use of much of the I. G. Farben chemical machinery will perhaps get a more realistic reception.

More Specialists

THE steady elimination of the post-war "sellers' market" and the substitution of keen commercial competition, based upon the quality of products, has been the characteristic of current commercial affairs. British industry, to meet the international trade challenge, must be armed with all the scientific and technical skill the country can muster. Fears have been expressed by leaders of various industries that the training of these sorely needed technicians will fall so short of the required numerical level that the coming years may witness the spectacle of British industrial enterprise crippled by lack of key-men. All the more gratifying, therefore, are the commendable efforts of the Northampton Polytechnic, London, to provide, under the auspices of its Department of Applied Chemistry, an important supple-

ment of scientific and technical training for chemical students.

Sharing the Burden

AT negligible cost students can avail themselves in the coming winter sessions, of part-time day and evening courses in both pure and applied chemistry and the newly published prospectus strikes an enterprising note by including courses in glassworking. Very few facilities for scientific and technical training in this sphere exist at present. Other new studies include special lecture courses in the technology of fuel and refractory materials. In the latter connection the acute shortage of refractory materials is acting as a serious impediment to the establishment of new branches of chemical industry and the extension of existing activities. Northampton Polytechnic appears determined that this material shortage shall not be further aggravated by a lack of trained personnel. The Polytechnic and similar institutions are performing a real service in assisting to relieve the burden imposed upon the universities in supplying technicians at a time when they are most needed.

GROWTH OF NEW SCOTTISH CHEMICAL ENTERPRISES

THE site at Grangemouth for the erection of a large plant to produce petroleum based chemicals has been surveyed and approved and work will begin as soon as sufficient labour and materials are available, probably next year.

The complete project will cost about £12 million and the new factory will be operated by British Petroleum Chemicals, Ltd., for which the capital has been subscribed by Anglo-Iranian Oil Co., Ltd., and the Distillers Co., Ltd.

Imperial Chemical Industries, Ltd., and a subsidiary of Anglo-Iranian Oil Co., Ltd.—Scottish Oils, Ltd.—are also associated with the enterprise.

Shale Oil Output

The last named firm—responsible for Scotland's shale oil industry—now provides employment for 4000 operatives and staff and the following monthly production figures

indicate the extent of present operations: Two million gallons of diesel oil for road vehicles; 800 tons of wax; six million gallons of motor spirit; 400 tons of paraffin coke, and 1700 tons of sulphate of ammonia fertiliser.

In addition, the slag remaining after the extraction of oil is used for the production of bricks and this type of building material was used extensively in the construction of the company's Pumphreston plant.

One of the more interesting products which have become available as a result of the research carried out jointly by the staffs of Scottish Oils, Ltd., and Anglo-Iranian is "Iranopol," the synthetic detergent for the production of which a large commercial plant was erected at the Pumphreston refinery, which now produces two million gallons of "Iranopol" a year for use in the engineering, tanning, dyeing, and paper-making industries.

RAPID PLANT ERECTION

Mass-Production Concrete Method in Sweden

SUCCESSFUL development is reported from Sweden of a mass-production method of fabrication in concrete of a type likely to be of direct use in the erection of chemical plant, such as large-scale liquid containers and chemical processing columns.

The "Prometo" method—reports the *Anglo-Swedish Review*—has been developed by two Swedish civil engineers, Erik von Heidenstam and Emrik Lindman. So far, it has been used mainly for the construction of grain and green fodder silos, although the method lends itself admirably for many other purposes. Thus, early this year a 120 ft. high twin silo structure for blast furnace slag was completed at the Björneborg ironworks in Central Sweden, and other recent constructions include oil tanks, concrete columns and water towers.

This concrete casting method has been put on the market by AB Produktionsmetoder, of Stockholm, after several years of practical tests and is based on the employment of "self-raising" moulding equipment of a special design.

The main parts consist of sliding steel moulds made in sections for easy assembly and dismantling. The sections are fixed to

a frame, which also carries a platform from which the concrete casters work. The concrete is hoisted to this platform and poured into the mould by means of distributing gear turning round the centre of the platform.

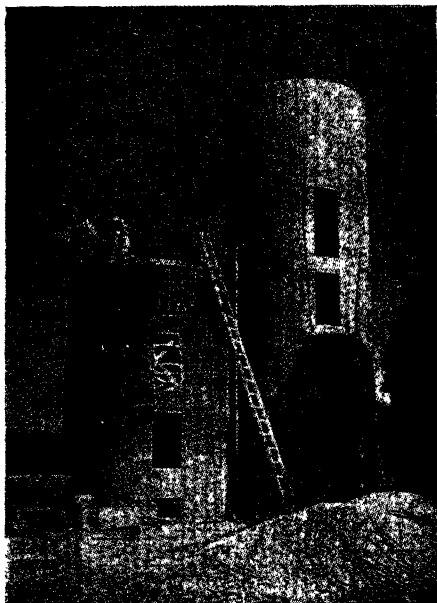
The entire equipment with moulds, platform, and workers is raised 1 in. every five minutes by means of hydraulic power jacks, and normal casting speed is thus about 1 ft. an hour.

It takes only about 50 hours, the *Review* records, for three men, working in shifts of two, to build the walls of a silo 30 ft. high, using the "Prometo" method. One man mixes the concrete, while the other, on the platform, distributes it in the mould, places the reinforcing rods in the concrete, and operates the hydraulic hoisting gear.

Concrete mixer, hoist and pressure oil pump for the hydraulic power jacks are electrically-driven, and no scaffolding is required during casting or dismantling. In the building of larger blocks of silos, the work is carried on by six men working in three two-men shifts, and they can complete, say, one 70 by 15 ft. grain silo in a week.

The thickness of the walls is generally 5 in., which is less than the normal for similar constructions; hence consumption of concrete is considerably reduced. The moulds can, however, be adjusted for the casting of thicker walls, if required.

These structures are stated to compare favourably in respect of quality and strength with the products of other building methods.



The process in operation.

Extension Plans in Austria

Plans to increase industrial activities in Upper-Austria include an enlargement of the Stickstoffwerke, Linz, which at present produces 60,000 tons of nitrogen yearly, and is intended to produce double that amount. The programme also includes the production of urea and methanol as well as 20,000 tons per annum of calcium carbide, in association with nitrocalcite fertilisers, and of polyvinyl chloride to be used by the Sempert works for artificial rubber.

A proposed extension of the Aluminium Works, Ranshofen, depends on the possibility of importing 120,000 tons of aluminium oxide. The production of silumin and of electrolytic antimony is also contemplated.

Metallurgical Research

Inter-Services Council Set Up

THE Admiralty and the Ministry of Supply have set up an Inter-Service Metallurgical Research Council to advise them on metallurgical problems of importance to the Services.

The formation of this council, states the Ministry, will provide for the interchange of ideas on metallurgical problems common to the different Services, and avoid overlap between their research programmes. It should also ensure that balance is maintained between fundamental and *ad hoc* research, and that the long-term research necessary for the provision of new alloys is embarked upon.

The Research Council includes representatives of the Admiralty and Ministry of Supply, and a number of distinguished metallurgists from the universities, industry, and other Government departments. The independent members are:—

Prof. L. Aitchison (Professor of Industrial Metallurgy, University of Birmingham); Prof. E. N. da C. Andrade (Quain Professor of Physics, University College, London); Prof. G. Wesley Austin (Goldsmiths' Professor of Metallurgy, Cambridge University); Mr. G. L. Bailey (director of the British Non-Ferrous Metals Research Association); Dr. R. W. Bailey (research consultant, Metropolitan Vickers Electrical Co., Ltd.); Mr. H. H. Burton (director of research, English Steel Corporation, Ltd.); Dr. W. Hume-Rothery (lecturer in chemistry, Oxford University); Dr. H. Moore; Mr. A. J. Murphy (research director, J. Stone & Co., Ltd.); Mr. D. A. Oliver (director of research, B.S.A. Group); Dr. C. J. Smithells (director of research, British Aluminium Co., Ltd.); Dr. C. Sykes (director of research, Brown Firth Research Laboratories); Dr. W. H. J. Vernon (Chemical Research Laboratory). The secretary is Mr. A. H. Waterfield of the Ministry of Supply.

CONTROL OF DYESTUFFS

DYESTUFFS and certain materials used in their manufacture will require an export licence under a new Board of Trade Order which came into operation on August 4.

This action, says the BoT, has been taken in consultation with the manufacturers and has been necessary in order to ensure adequate supplies to industries producing goods for export, particularly textiles.

Applications for licences should be sent direct to: Board of Trade, Dyestuffs Control, Guardian Chambers, 28 Blackfriars Street, Manchester, 3.

Anglo-Swedish Trade.—Discussions between the U.K. and Sweden have resulted in agreement being reached on an expansion of Swedish exports to this country including chemicals, pitprops, newsprint, paper and some manufactured goods.

Disaster at Ludwigshaven

Death Roll Believed to Exceed 200

A WEEK after the largest of the I.G. Farben chemical plants in Germany was swept by fire and a series of explosions, likened in their devastating effect to the dropping of an atomic bomb, no precise information was to be had of the cause or of the number of lives lost.

The first reports received in this country on Thursday last week related how at 3.45 p.m. the previous day, fire and explosions occurred in the lacquer workshops of the Badische Anilin Soda Fabrik, the I.G. Farben establishment at Ludwigshaven where more than 20,000 are engaged in the production of heavy chemicals, including sulphuric acid, nitrogen, dyes and paints. Three heavy explosions occurred and flames spread with great rapidity through the vast, closely built-up industrial area, which stretched for several miles along the west bank of the Rhine, until they reached a menthol plant. Then four further explosions resulted, the force of which is indicated by the fact that windows were smashed and slates stripped from the roofs in Mannheim on the farther bank of the Rhine.

Sudden Havoc

Because of the speed with which the flames swept over the great factory area, and the collapse of buildings under blast from the explosions, the toll in deaths and casualties was exceptionally high. First reports alleged that many hundreds had perished in the ruined buildings. Late this week, when it was still not possible to announce the final number with certainty, it was stated more or less authoritatively that between 200 and 250 had lost their lives, and in the hospitals were more than a thousand casualties.

Many of these had been badly cut with flying glass or affected by the suffocating fumes and gases liberated by the explosions or generated by the flames and the mixture of chemicals. This asphyxiating effect, which necessitated the large American Army fire-fighting force from Mannheim wearing respirators, may have added considerably to the death roll, incapacitating many who might otherwise have escaped.

While no authoritative verdict has been given on the cause or results of the disaster, some statements have suggested that initial detonation may have been due to the heat of the sun on escaping ethyl chloride gas, and that thereafter phosgene gas may have been spontaneously produced. Rumours that some of the plants involved were engaged in the production of recognised explosives have been officially denied.



These pictures, taken soon after the flames were quelled, are evidence of the extent of the destruction wrought by flames and blast in last week's disaster in the heart of the I. G. Farben plant. In the first picture, German police are seen searching for bodies at a point where stood a six-story building which was filled with workers when the outbreak occurred. In the picture below, one more victim is being removed from the main building area, in which the original explosion occurred



Canadian Sodium Sulphate

150,000 Tons a Year from
Natural Sources

A NEW publicly-owned sodium sulphate plant at Chaplin, Regina, Canada, has been opened by Mr. T. C. Douglas, the Saskatchewan Premier, who said in his address that the event "marked an important milestone in the development of the Province's sodium sulphate deposit of Lake Chaplin." Mr. Douglas set in motion the first car of salt cake destined for Nova Scotia. The new plant, constructed at a cost of \$1 million, will produce 150,000 tons per year of sodium sulphate of exceptional purity.

Developed from an idea of the manager, Mr. A. E. Holland, a brining process is being employed. During the warm weather, when the lake contains a 50 per cent solution of sodium sulphate, the brine is pumped through a 600-ft. ditch line from the lake into three vast reservoirs. As the weather becomes cooler the salts form crystals which drop to the reservoir bottoms where by late fall a weak brine is left. This weak solution is then drained off and a crystal bed of sodium sulphate four or five feet thick remains. During the winter these crystals are harvested by bulldozer and dragline, and stockpiled. After processing to remove any water, dry, powdered sodium sulphate remains.

Largest Canadian Plant

The first production line in the Chaplin plant—the largest and best equipped plant of its kind in North America—was completed in May. A belt conveyor, 1100 ft. long and 2 ft. wide, carries the raw salt from the stockpiles to the refinery where it is drawn from a bin by screw conveyors into four evaporators. Here the raw material is melted in its own water of crystallisation, and the anhydrous salt which drops to the bottom is drawn off to a special filter.

All but 10 per cent of the moisture is removed by the filter, the remaining 10 per cent being evaporated in a 60-ft. rotary dryer. The salt cake is then screened and ground to a fine powder which is conveyed to steel bins, each 40 ft. in diameter and 40 ft. high, where it is stored prior to shipment.

Used primarily in the production of kraft paper, which gets its extra toughness from sodium sulphate, the demand for the salt cake has greatly increased in recent years. The chemical is also used in soap detergents or "soapless soaps," as a mordant in dyeing, in stock feeds, and in the separation of

(Continued at foot of next column)

Indian Petrol and Coal

U.S.A. and Czechoslovakia to
Collaborate

AT the invitation of the Indian Council of Industrial and Scientific Research, a number of U.S. oil experts have arrived in India to advise upon the proposed establishment of a synthetic petrol industry.

Their report, which will be ready by mid-September, will contain estimates of capital expenditure and production costs, and a suggested lay-out of the new plant, which will probably be erected at Bihar.

Coal Consumption

Preliminary Indian reports have calculated production costs on the basis of one ton of synthetic petrol from seven tons of coal and the proposed annual target figure of one million tons of petrol would utilise one quarter of the country's current yearly coal output.

The Indian Government is now considering three measures to overcome the shortage of petrol and by-products. These are, the extraction of oil from coal, compulsory mixture of power-alcohol with petrol and the construction of refineries to process crude oil from the Middle East.

Other foreign experts visiting India at present are members of a Czechoslovakian technical mission which is preparing a series of reports to the Indian Government on the better use of coal reserves, for the chemical and metallurgical industries and power generation.

The first survey produced by the Czechs states that by the introduction of modern combustion equipment, capable of burning coals with a high-ash content, the reserves of "workable" coal in India could be increased three-fold.

Grading System

It is also suggested that washing and screening plants—built of imported equipment from Czechoslovakia—should be erected in the Bihar and Bengal coalfields and a more careful grading system be introduced at the coal-producing centres.

The report also recommends that all coal with an "ash-fraction" of 30-50 per cent should pass to the power stations and the higher grade coals producing less ash should be used for metallurgical or chemical purposes.

copper and nickel during the refining process.

The market for the product covers many parts of the world and it is shipped, usually in bulk carloads, as far east in Canada as Bathurst, Nova Scotia, and as far west as Vancouver, B.C.

NEW ELECTROSTATIC PRECIPITATORS

Aiding Industrial Efficiency and Smoke Abatement

EXCEPTIONALLY high efficiencies not previously obtained in the recovery and removal of entrained solid or liquid particles from industrial gases are claimed to have been achieved with new electrostatic precipitators recently introduced to American industry by the Koppers Company, Inc., of Pittsburgh, Pa., which is manufacturing the precipitators in the United States under licence from the Swiss firm, Elex S.A.

In all cases where the new precipitators have undergone complete tests they are reported to have exceeded guaranteed efficiencies—not less than 95 per cent in tests covering full 24-hour periods, including operation when collected material is discharged from the electrodes. The precipitators appear, moreover, to permit an important advance in measures to solve the problem of smoke eradication from industrial cities. Maximum removal of solids or liquids from industrial gases to meet the increasing demand for minimum residuals exhausted to the atmosphere requires very advanced electrical precipitation technique.

For Specific Requirements

For some time now the eradication of smoke has been an urgent problem for U.S. industries, and many larger cities have passed smoke abatement ordinances. While residuals permissible under widely varying ordinances range from .25 gr. to .75 gr. per cu. ft., .25 gr. is being urged as the maximum acceptable residual. Many corporations, however, are calling for a maximum of .15 gr. per cu. ft. and such residuals are not possible with most conventional equipment.

The new precipitators are designed to meet specific requirements in the following categories:—

1. For removal and recovery of tar oil and water from coke oven, producer, and carburetted water gases. The precipitator also serves the necessary purpose of gas refinement, thereby materially improving overall plant operation.

2. For cleaning blast furnace gas to improve its efficiency as a fuel in the operation of stoves, coke ovens, generators, boilers, etc. Varying degrees of cleaning are required. Modern stoves, with smaller tile openings, and coke ovens of the underjet type require considerably lower residuals than other equipment.

3. For precipitation and recovery for re-use of dry dusts from gases arising from



Koppers-Elex precipitator installed at a U.S. chemical plant where it is used to remove acid-mist. This type of apparatus is finding a wide application in the process industries, notably in oil refineries and in the extraction of fluorides from burning black liquor

kettles, mixers, dryers, conveyors, and grinding mills.

4. A type for use in the process industries. In such applications, the precipitators remove and/or recover acid mist, oil refinery catalysts, salt cake or soda ash from burning black liquor in sulphate processes, fluorides, aluminium hydroxide, carbon black, etc. All such elements recovered, except acid mist, are valuable.

5. A precipitator for use in metallurgical operations. In such installations valuable metallic products are recovered from gases emanating from reverberatory, electric, roasting, and sintering furnaces.

6. A most important type of the new precipitator is offered for the removal of fly ash from power plant boiler gas. The main function of this unit is to abate nuisance and enable power plants to comply with strict municipal ordinances.

Some official results of tests with Koppers-Elex precipitator installations show: a soda ash recovery precipitator at a Southern pulp

and paper mill. Specified volume—70,000 cu. ft. per minute; actual volume approximately 90,000 c.f.m. specified efficiency—90 per cent; recovery efficiency = 95+ per cent. The guaranteed recovery of soda ash under specific conditions was 9.7 tons per day; actually, it averaged, it is said, 14.96 tons per day.

Gypsum recovery from calcining kettles in an East Coast plant: Volume of gas—4500 c.f.m. for each of four. Tests on four precipitators show from 98.7 to 99.8 per cent efficiency; 97 per cent efficiency was guaranteed.

Detarrer precipitators at an eastern manufactured gas plant: Guaranteed efficiency—95 per cent; actual efficiency—98 to 99.2 per cent. Saleable tar was recovered.

A blast furnace type precipitator at a

mid-western steel plant: Gas volume—80,000 c.f.m.; guaranteed efficiency—95 per cent; actual efficiency—98.5 to 99.4 per cent; required residual .015, actual residual—.002 to .00048 gr. per cu. ft.

Research and Development

The precipitators for solid particle removal are designed for periodic rapping to discharge the dust from the collecting electrodes in a single gas lane at a time, with the dust required to fall a maximum of 26 in. before passing out of the gas stream. This drop reduces to a minimum the re-entrainment. Such rapping is actuated by clock-timer controls. The electrical power units for the precipitators are of two types—one known as the "Flex-Pak," and the other as the "Vac-Pak," for which no special substation is required.

Magnetic Filtration of Lubricating Oils

EFFECTIVE treatment of a common industrial problem, the filtration of lubricating oils, is being given exacting tests on the London Midland Region of the British Railways. Here the problem was to eliminate ferrous contamination in the lubricant of two new diesel-electric locomotives designed to draw expresses at speeds up to 100 m.p.h.

The filtration equipment was entrusted to Philips Electrical, Ltd. Two filter units are in use in the No. 10,000 locomotive now running daily between London and Derby, and a further two were fitted to the "sister-ship," No. 10,001, which was lately completed at the works at Derby.

The filters are fitted in the main lubricating oil circuit of the 16 cylinder, 1600 h.p. engine component of each locomotive. The oil enters the filter from the scavenger pump, and, on leaving it, goes to the oil cooling radiator. The flow capacity that each filter deals with is, 1500 gallons per hour. Each filter will trap ferrous contamination in the oil flow down to a particle size of 1/25,000 in. and, by removing such contamination prevent oxidation of the oil, and considerably lengthen its effective lubricating life.

The filters are small, measuring only 12½ in. by 6½ in. by 5½ in. and can therefore be comfortably accommodated in any intricate construction without interference with the layout.

The design of the filter unit is ingenious in that the ferrous particles do not touch the magnet itself. In construction a powerful permanent magnet is surrounded by filter cages which are not in themselves magnetic. They become magnetised only when gripped in position by the magnet and

they attract to themselves the metallic particles held in suspension in the oil.

The reason for the design is to enable cleaning to be carried out speedily and effectively. To do this, it is necessary only to slacken the bolts holding the cover in position and to remove the complete assembly. The filter cages can then be forced away from the magnet and immediately lose their magnetism and the contamination falls away. A quick wash in paraffin removes the last traces. Replacements should take not more than five minutes.

It is understood that trials of the engines will be conducted in the autumn, matching the diesel-electrics against steam locomotives of comparable power, for hauling and speed capabilities.

Better Supplies of Edible Oils

A Press note from the Ministry of Food, commenting on the distribution of olive oil and teaseed oil, now being privately imported in much larger quantities than they were last year, observes that there is no statutory control of the prices and the distribution of these oils is unrestricted except that a licence is needed to wholesale olive oil. Selling prices are considerably lower than those ruling last year, olive oil being sold at about 30s. per gallon in bulk from importers. Supplies of refined teaseed oil later in the year should be on sale at prices lower than those for olive oil.

DAVY-FARADAY EXHIBITION IN PARIS

France Commemorates Fundamental Research

From a Special Correspondent

A PLEASANT surprise awaited any British chemist recently in Paris who chose to visit the famous Palais de la Découverte. In recent weeks the main display there has been a Davy-Faraday Exhibition housed in the Great Round Hall close to the entrance. The principal emphasis, naturally, rested upon telecommunications and power transmission, but there was much to interest the chemist and metallurgist.

For the serious student there were displays of original apparatus and experiments; for the curious schoolboy, ingenious adaptations of the classic experiments; while for those who like their educational pill sugared, there were "human interest" exhibits.

The exhibition was in three concentric circles around a statue of Faraday. At the foot of the statue were show-cases containing original apparatus or copies. In the second circle was apparatus set up for experiments which were carried out by demonstrators. Around these in turn were exhibits of industry's uses of basic principles discovered by Davy and Faraday. Overhead and around the hall appeared great murals comprising portraits of the men and *montages* of various consequences of their work.

Whole groups of apparatus had been lent by London's Science Museum and the Royal Institution. They included Faraday's apparatus for gas liquefaction—a manual compressor, connecting tubes and a refrigerated receiver. Samples of gases liquefied by

Faraday himself, which were on view, comprised arsine, cyanogen and hydrobromic acid. The first sample of benzene separated by Faraday in 1825 was displayed, with the distillation apparatus used for its isolation.

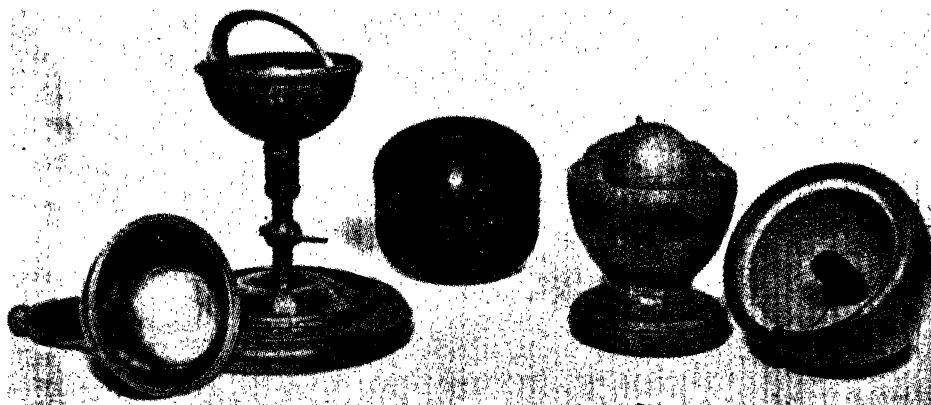
In a series of ferrous alloys there is evidence that even the greatest of scientists have their experimental failures. Faraday aimed at preparing unrusting steels, based on the observation that meteorites, known to contain nickel, were less subject to oxidation than ordinary iron. Accordingly, he prepared nickel-iron alloys and attempted to prepare alloys containing silver, platinum and aluminium, of which the last had not been isolated. No practical useful results were obtained.

This was the experience, too, with experiments on the improvement of optical glass. Lead borates and borosilicates were almost exclusively used, on the grounds of easy fusibility and high dispersive power. Unfortunately, the products were never usable for telescopic lenses as had been hoped.

Original samples of gold sols and films of colloidal gold were on view. They were prepared in the course of research in 1856 into the way in which light was affected in passing through suspensions or thin films.

Faraday's Laws were illustrated by three voltmeters filled with dilute sulphuric acid and passing different currents which were clearly indicated on large ammeters. The tubes were calibrated and thus showed the direct relationship between rate of gas evolution and current.

(Continued overleaf)



This was part of Faraday's apparatus for measuring dielectric constants

There was a demonstration repeating the original famous experiment of Davy in which he electrolysed caustic potash and observed "small globules having a high metallic lustre similar in visible character to quicksilver."

Various experimental lamps constructed by Davy showed the development of his ideas towards the final famous Safety Lamp surrounded by metal gauze.

Industrial Applications

In the outermost circle, demonstrators showed visitors electrolytic polishing of brass in phosphoric acid, or nickel plating, or anodising and dyeing of aluminium. A pH meter and an electro-metric titration unit formed part of a display of electrolytic test and analysis apparatus.

Electrothermal effects were shown by models of furnaces used in the aluminium industry, including one of the first Héroult furnaces.

Industrial electrolysis was represented by

a model section of a cell for the preparation of chlorine.

"Human Interest" Features

Adjoining the main hall were small exhibits mainly of the "human interest" category. Here was to be seen a moving letter of thanks to Sir Humphry Davy from the miners of Whitehaven for his Safety Lamp. There were several other letters, medals, portraits and originals of pamphlets and journals. Faraday's microscope and slide rule and note-books of both these workers were also to be seen.

A novel type of exhibit, in an adjoining alcove, was a reconstruction of Faraday's study and a corner of his laboratory at the Royal Institution.

As one surveyed the exhibition as a whole it amply confirmed the director's words in his preface to the exhibition catalogue:—"These exhibitions place on record the beneficent rôle of science when man does not turn it to evil ends."

Eliminating Phosphorus : Swedish Iron Ore Process

SWEDISH iron interests, the Grängesberg Company, are credited with having successfully developed an individual method of eliminating phosphorus from iron ore. For this company, the largest iron mine-owners in Sweden, the process is of special importance, because of the high phosphorus content of most of its material.

The process—reports the *Anglo-Swedish Review*—will use iron ore from the mines of Central Sweden which, unlike the Lapland mines, yield ore of a fairly high phosphorus content. When purified, this ore can be used for the manufacture of spongy iron, which is gradually replacing pig iron for steel production.

The process used by the Grängesberg Company consists principally in concentrating the ore and extracting the phosphorus by acid treatment. The company has tested the method on a small scale for about a year and is now building a large de-phosphorising plant.

Saving Charcoal

The modernisation and expansion being carried out in Swedish mines and ironworks aim not only at increased production, but also at the manufacture of cheaper and better steel, said Mr. E. Wijkander, managing director of the Bofors undertaking, in a recent speech at a mining congress in Sweden. The development of an economical method of producing sponge iron in large quantities has for many years presented metallurgists with a difficult problem.

The methods which have been successfully

tried in Sweden for some time past constitute a practicable and economic solution of the problem. In these processes, the "Höganäs" process and the Söderfors-Wiberg method, malleable iron is obtained direct by the reduction of the ore, the temperature being too low to allow the iron to melt.

Direct from Ore

The product contains very little carbon and is not suitable for the manufacture of bar iron, but it has been found most useful as raw material for the production of steel by the open-hearth and electric process. Whether sponge iron can be used economically depends on its price and quality, as compared with those of other raw materials for steel production.

"There are many signs of a revolution in the supply of raw materials in this field," Mr. Wijkander declared. "Sponge iron will replace charcoal pig-iron," he predicted, "which also means that the demand for charcoal will diminish. This is a desirable development in our present situation."

Paint Apprenticeship Scheme.—The Paint Apprenticeship Council (THE CHEMICAL AGE, July 10), has appointed a sub-committee to implement the apprenticeship scheme and prepare a programme. That committee has now met and is actively engaged in preparing details of the technical education facilities in the various paint centres of Britain.

Metallurgical Section

Published the first Saturday in the month

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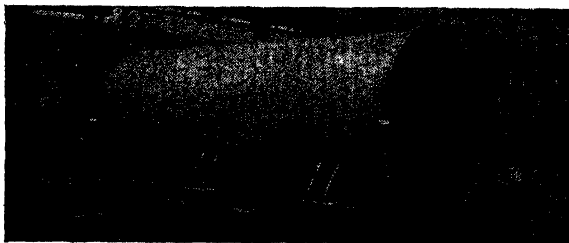
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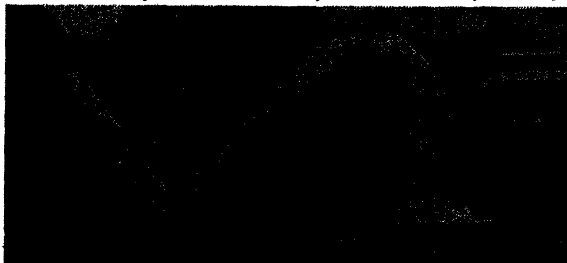
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Metallurgical Section

7 August 1948

ADVANCE OF POWDER METALLURGY

Current Practice and Theory Reviewed at Graz

FAVOURED with 70 papers by technicians and scientists, the first International Powder Metallurgy Congress in Graz, July 12-17, emphasised the importance of the effect of recent work on this subject and fully established the fact that powder metallurgy commands an essential place in the field of general metallurgy.

A great audience attended the lectures and discussions which were held in seven sections, dealing with: 1. Manufacture and properties of powders; 2. Sintering; 3. Test methods for sintered and unsintered powders; 4. Manufacture, properties and applications of sintered products; 5. Hard metals; 6. Sintered magnets and magnetic materials; 7. General principles and allied fields of powder metallurgy.

The papers gave fundamental backgrounds as well as practical applications and brought up-to-date much that has already been published. They described most of the problems encountered and the methods of overcoming them. Some of these papers have been published in the *Powder Metallurgy Bulletin*, edited by Dr. Paul Schwarzkopf and sponsored by American Electro Metal Corporation, 320 Yonkers Avenue, Yonkers 2, N.Y. They were brought before the Congress for discussion only. The full text of all the papers will be published in the future issues of the *Oesterreichische Chemiker Zeitung*, Vienna, and afterwards in book form by the Academic Press.

British Contribution

Among the contributions by English workers were "A Contribution to the Knowledge of the Ternary System, Tungsten-Carbon-Cobalt" by L. D. Brownlee, Manchester; and "The Preparation and Some Properties of Alloys of Titanium and Tungsten Carbide," by A. G. Metcalfe, Cambridge.

The first of these gave some important results of examining a series of sintered alloys by X-ray diffraction. A temperature of 1350°C was chosen for this investigation. Since the alloys examined were necessarily at room temperature, it was not possible to say definitely that the

results obtained were representative of the constitution of the alloys at the sintering temperature.

However, by sintering for various times to reach equilibrium and cooling rapidly, where necessary by quenching, it was possible to obtain a series of results which enabled a ternary diagram to be constructed. This diagram shows a large area which is liquid at 1350°C, a very large three phase region WC+C+liquid, and an interesting series of phase fields in the tungsten-rich corner of the system.

The single phase region η , having a complex-crystal structure, was shown and its relation to the normal cemented carbide structure clearly brought out. Finally, photo micrographs of typical cemented carbides were displayed, showing some of these structures.

Carbide Studies

In his study of titanium and tungsten carbide, A. G. Metcalfe briefly discussed the effect of titanium carbide on the cutting properties and structure of cemented carbides, and gave a short outline of the preparation and sintering of this type of hard metal. The conditions which are necessary for the preparation of oxygen-free and carbon-saturated titanium carbide were discussed, and compared with the methods at present used industrially.

Some results were given of a determination of the section from WC to TiC of the ternary equilibrium diagram Ti-W-C at temperatures up to approximately 2900°C, using metallographic and X-ray diffraction methods. These results are now supported by measurements of the electrical resistance.

The structure of these carbides is investigated by the measurement of the density and of the X-ray diffraction intensities, and by indirect evidence from the lattice parameters of low carbon- and oxygen-containing titanium carbide. The marked divergence of the lattice-parameter, v , composition curve was discussed, some theories advanced to explain this, and 13 lantern-slides shown.

An American contribution, by W. E.

Kingston, New York, provided new light on the mechanism of sintering of powdered metal compacts. It recalled that so far no entirely acceptable theoretical treatment had been advanced to explain the mechanism by which powdered metals are transformed into homogeneous sintered bodies. This state of affairs has undoubtedly retarded advancement in this field.

It is understandable that so little progress has been made in such fundamental studies, since experimental proof has been difficult to obtain, due to the unfavourable mechanical properties of partially sintered compacts, which have previously prevented accurate structural analyses during the progress of the reactions.

In the author's opinion, one of the chief factors in the present unsatisfactory state of theory of the mechanism of sintering is that most workers have preferred to treat the phenomena occurring in this process as anomalous as compared with the proved mechanism occurring in reguline metals, thereby making it much more difficult to develop a clear-cut integrated theory of the

sintering process which would withstand critical examination.

In this paper, the first of a series, a basic theory of the mechanism of sintering is given, with an explanation of the fundamental principles involved, as well as the presentation of experimental techniques and data.

This theory is based on the well known principles of self-diffusion in metals, as evidenced by nucleation, stress relief, and grain growth. The hypotheses involved could equally be applied to the cold bonding of massive metals, as in cold welding of strips, etc.

The author has been able to develop metallographic techniques, which have allowed more intimate study of behaviour of the individual metal powder particles during the sintering operation, and thus has been able to apply this important tool in substantiating his hypothesis. He has also used to good advantage in his studies of such phenomena electron microscopy, X-ray diffraction, and other conventional test methods.

Electrolytic Deposition of Metal Powders

AS pointed out in the powder metallurgy symposium of the Iron and Steel Institute last year, few outstanding inventions can now be expected in this field, and progress will be gradual.

Any new development, though slight, may, however, form the subject of a single patent and several of these together may constitute an appreciable advance. This will probably apply to the 14 patent applications in the name of Davide Primavesi, of Lugano, Switzerland (Eng. Pat. Appn. Nos. 34519-34532/1947), but until a process has been tried out on an industrial scale it is difficult to assess its practical value.

Three of these applications relate to metal powder production (Nos. 34519-20 and 34527/1947) and the remainder to compacting (sintering, moulding, etc.).

Deposition Process

The first two relate to improvements in electrolytic deposition of metals as powders (34519) and in the purification or concentration of magnetic powders (34520).

The former describes methods whereby an anode is used containing the metal to be deposited and electrolyte containing halogen compounds of metal to be deposited. This latter (electrolyte) may be a salt melt or solution, and if an alloy is required in powder form the melt may contain two or

more halogen compounds. The anode similarly may consist of two or more metals. The process applies more particularly to iron and iron alloys, but is not necessarily limited in this respect.

Better Control

Special attention has been paid to iron ion concentration. It can be controlled by introducing the halogen into the bath in gaseous form, or mixed halogens or compounds; and in this way the grain size of metal deposited can also be controlled, e.g., large cube form crystals are obtained suitable for metallurgical purposes. Through controlled ion concentration the voltage, too, may be kept low, thus preventing precipitation of the more electropositive metals—sodium, or sodium and potassium.

In an example, the electrolyte was of NaCl and KCl at a temperature of 750°; potential difference was 4 v, whereby fine almost amorphous powder was obtained. A slow stream of chlorine gas was introduced deep down in salt melt through an iron tube and after a few litres had been passed voltage was down to 1.9. It then rose slowly again and after 4-8 hours, during which it had increased by about 0.5 v, chlorine was again introduced for a few minutes, resulting in reduced potential.

GAS CARBURISATION OF STEEL

Affording Precise Control and Rapid Processing

CARBURISATION of steel may be carried out with solid, liquid or gaseous media. Although it is probably true that the use of solid carburisers is more widespread, the claims of gas carburising—particularly where precise control is essential, and where large components are to be processed—merit consideration.

Equipment now available permits low processing costs and a short time of treatment, as well as possessing advantages of compactness and cleanliness. The principles and plant are reviewed in detail in the current technical information sheet issued by Wild Barfield Electric Furnaces, Ltd.

Where "natural gas" is not obtainable, carburising atmospheres are normally of the high hydro-carbon type, suitably diluted, and may consist of butane or propane diluted with charcoal burner gas, raw town's gas or burnt town's gas. Such hydro-carbons possess the characteristic of "cracking" on the steel surfaces at temperature, and give rise to carbon deposition which takes the form of a hard adherent scale. This results

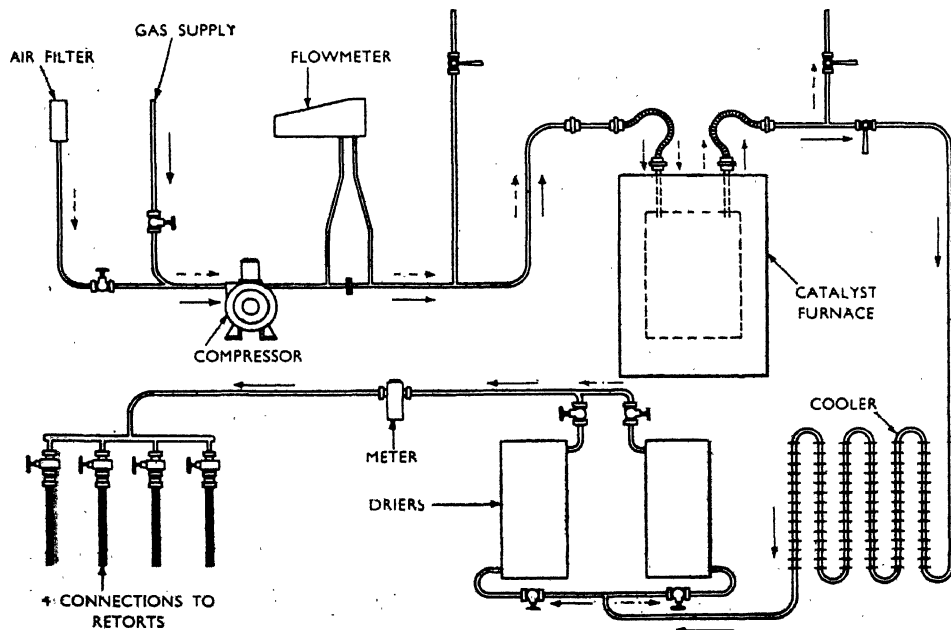
in retardation of the carburising rate and fouling of retorts. Such conditions prevent precise control of the carburising process for the "stopping-off" effect of the deposit may vary, and unless such control is available, the full benefits of gas carburising cannot be utilised.

Two courses may be adopted, viz., (1) a balanced mixture of hydrocarbon/diluent gas must be achieved with sooting restricted as much as possible, or (2) the gas must be diluted sufficiently to eliminate sooting completely.

The latter course, however, results in carburising below the maximum rate, with the danger of under-carburising the less favourably disposed parts of the charge and consequent lack of uniformity throughout. The time for carburising must also be increased, and it is impossible to avoid a steep carbon gradient inwards from the surface of the steel.

There are other important factors, each with a bearing on the rate of carburisation. These include:—

(a) The temperature at which the treat-



The control and treatment of the gas is illustrated in this diagrammatic view

(Courtesy of Wild Barfield Electric Furnaces, Ltd.)

ment is carried out (even minor temperature changes can have marked effects);

(b) The length of time the material is under treatment. (Case depth is proportional to the square root of the carburising time when the surface carbon potential and diffusivity co-efficient are constant; and

(c) The rate of the flow of the gas. This is particularly important where a balance has to be struck between two atmospheres, with the object of preventing deposition of too much carbon and ensuring that carburisation proceeds at the maximum rate for any given temperature. With prepared town's gas, the rate of flow is not at all critical provided a certain minimum is exceeded for a given plant size.

There are, therefore, certain conditions which must be satisfied before gas carburising can be used to full advantage. These may be summarised briefly as follows:

(a) Constant and uniform temperature of the actual work and an exact knowledge of that precise temperature; and

(b) A satisfactory gas composition.

To meet these requirements a non-variable atmosphere is essential. The prime carburising constituents of raw town's gas, methane and carbon monoxide, are ideal, for they do not leave a hard deposit on the surface of steel at temperature. Raw town's gas, however, also contains carbon dioxide, oxygen, water vapour and small amounts of organic sulphur compounds which make it unsuitable for carburising unless it is treated. A process has accordingly been developed to remove the deleterious constituents of town's gas without, however, serious interference with its carburising constituents.

The action of the catalyst employed in the process may be seen from the following typical analyses of town's gas before and after passing through the catalyst:—

	Raw town's gas Per cent.	Prepared town's gas Per cent.
Carbon dioxide	3.3	—
Oxygen	0.6	—
Unsaturated hydro-carbons ...	2.1	0.6
Carbon monoxide	16.4	20.2
Methane	24.0	23.6
Hydrogen	49.5	51.2
Nitrogen (balance)	4.1	4.4
	100.0	100.0

It will be seen that the methane content is only slightly reduced and there is a considerable increase in the amount of carbon monoxide. Town's gas supplies vary according to the method of production, but invariably, if the methane content is low, the carbon monoxide content is correspondingly high.

From the diagram reproduced it will be seen that town's gas direct from the mains is fed to a compressor, through a flow meter to a special catalyst passing an air cooler to driers and then direct to the carburising retorts.

The gas from the catalyst exit passes through the air cooler to silica gel driers, of which one only is used at a time so that the plant can be operated continuously. Regeneration of the silica gel is effected by a low temperature treatment in a small forced air circulation furnace. After passage through the drier, the gas goes via an inferential meter to the carburising retorts.

Sweden Prepares to Produce 300,000 M. Units of Penicillin

PENICILLIN manufacture, hitherto principally carried on by Britain and the U.S.A., has recently been established in Stockholm, Sweden, by the opening of a factory by Karnbolaget AB, a subsidiary of the large brewing concern Stockholms Bryggerier AB. This company, says the *Anglo-Swedish Review*, has one of the largest biochemical laboratories in the country.

It has been stated authoritatively that the plant is capable of supplying the entire needs of Sweden, which in 1947 consumed about 300,000 million international units, excluding penicillin for veterinary purposes.

The three main departments of the plant are concerned with fermentation, extraction, and drying. During the fermentation stage, the penicillin-producing fungi is permitted to grow under suitable conditions for three days, and then removed by filtration, which leaves a low-percentage solution

of penicillin. In the extraction department the filtrate is purified by means of solvents, and the solution concentrated from 6000 to 7000 litres to about 10 litres, when it contains 10 to 20 per cent penicillin.

The final stage in the manufacturing process is the drying, which must be performed at a temperature of -30°C . owing to the delicate nature of the penicillin at ordinary temperatures. The frozen penicillin solution is evaporated at a pressure of 0.00002 kg./cm.², leaving it as a dry powder. Finally, the penicillin is bottled in a "pressurised" room by special personnel working in ultra-violet light and taking every possible precaution against contamination of the product.

The entire staff of the new plant consists of just over thirty people, mainly employed in laboratory work, control and packing, the actual process of penicillin manufacture being almost wholly automatic.

Giant Pipe Bends

Departure from Welding Technique

THE bending of a pipe large enough to house an automobile has been accomplished by a new machine recently perfected by the M. W. Kellogg Company, engineers and steel fabricators, New Jersey, U.S.A.

According to the firm's technicians, large-diameter pipe bends produced by the apparatus were found to be of higher quality than those fabricated by the conventional welded segment process.

Wartime Problem

During the war the advent of giant petroleum refining plants necessitated the use of large-diameter piping, but at that time bending apparatus throughout the U.S.A. could be applied only to pipes with a maximum diameter of 34 in. Bends larger than this had to be fabricated of segments welded together—an expensive and lengthy operation.

In addition, bends of this type showed a tendency to corrode rather rapidly and crack at points where internal stresses were unavoidable, due to the welding of the five or six segmental sections of the bend. Although these faults could be minimised by

the use of stress-relieving heat treatments, engineers realised that it would be far more efficient to make a continuous, smooth bend from one piece of large diameter pipe.

The Kellogg apparatus is claimed to be capable of dealing with pipes up to a diameter of 100 in.

Hydraulic Pressure Used

The process bends pipe in the hot state under hydraulic pressure and is equally adaptable to small and large diameters, thin and thick walled pipe, and short or long radius bends. It is currently being employed to fabricate 50-in. pipe bends for the carrier lines of large oil refining units.

The use of the new method is said to result in improved products, better performance and reduced maintenance costs. The smooth, even bend is claimed almost to eliminate erosion and eddy currents due to sudden changes in direction or to sharp-cornered fillets which act as stress raisers.

The pipe is bent while hot and then cooled slowly, the stress remaining constant throughout the bend, thereby minimising the effects of stress corrosion.

The process is expected to be widely used in the production of pipe-bends for steam, gas and hydro-electric plants, wind tunnels and petroleum refinery installations.



Claimed to be the largest one-piece bend ever made, the curvature is being applied to this 50-in. pipe by hydraulic pressure and heat treatment

Record Belgian Output

IN a recent special supplement devoted to Belgian commerce and industry the *New York Herald Tribune* states that Belgium's chemical industry, now accounting for 12 per cent of the country's exports, has broken all pre-war production records. Emphasis at present is placed upon increased synthetic production resulting in more finished products with a higher unit value.

Fertilisers occupy an important place among chemical exports and output is considerably higher than in 1947. The production of sulphuric acid has already reached the pre-war level of one million tons a year, while production of sodium sulphate, a principal raw material of the Belgian glass industry, has reached a yearly level of 100,000 tons. Roughly 20 per cent of the world's production of copper sulphate comes from Belgium, and current production is estimated at 80,000 tons a year.

Among the important mineral salts produced in Belgium at the present time are zinc chloride, calcium chloride, ammonium chloride, phosphates, iron sulphate, zinc sulphate, and uranium salts, and although output is never revealed it is hinted that mines in the Belgian Congo are producing 90 per cent of the world's uranium ore.

Japanese Aluminium and Lead

Rapid Development Based on Ample Power Supplies

THE development of the Japanese non-ferrous metals industry, much of which had its principal period of development in the '30's and was greatly accelerated in the war years and those immediately preceding them, is described at length in recent official U.S.A. publications, which also throw some light on the limited revival which has been permitted since the occupation.

The background of Japan's aluminium industry has been made the subject of a full-length review (76 pp.) of information supplied by U.S. Foreign Service Offices and others, "Aluminium Metallurgy in the Japanese Empire." This observes that before 1938 Japan was a substantial importer and consumer of aluminium. After 1938 production matched consumption, at about 20,000 tons annually, and five years later the Japanese Empire was fourth in the world as a producer of aluminium, with 150,000 tons in 1943, the peak year.

During 1941-45 aluminium produced in Japan itself was valued at 1.6 times more than copper, the next non-ferrous metal in order of value. Most of the raw materials for production of alumina and aluminium were imported.

The basis of Japan's aluminium industry, like that of the other great producers, the U.S.A., Canada, and Germany, was its ample supply of low-cost electric power. With the exception of the North American producers, all had to import bauxite, the raw material of virtually all aluminium.

Production methods varied little from those used in America and Europe, whence processes and equipment designs were borrowed. Alumina-manufacturing practice favoured American methods and used American-designed equipment almost exclusively. Reduction of alumina to metal followed European practice more closely. The Söderberg continuously-formed, self-baking electrode, as yet little used in the United States, was generally preferred to the solid electrode cell. A marked tendency towards the use of high-current cells up to 40,000 amperes developed.

As the supplies of bauxite and other imported raw materials became difficult to maintain in war, Japanese metallurgists resorted to desperate means for processing Manchurian aluminous shales and domestic materials, including clays and alunite. These efforts were uneconomic and resulted in few new techniques of value to peacetime competitive production. Possible exceptions may be the calcium aluminate method for alumina, which was operated successfully

with aluminous shale by Japanese engineers in Manchuria, and some success in production of alumina from shale was attained by a direct-fusion process, using the electric furnace. Neither process was originated by the Japanese. They did not master the lime-soda-sinter process for alumina.

Production of aluminium was suspended when Japan surrendered. Production of secondary aluminium from scrap was resumed early in 1946 and attained a production-rate of about 10,000 tons towards the end of that year.

The report describes in detail the 14 existing plants, their current position and outlook. It contains 20 illustrations, numerous tables and a comprehensive bibliography.

Japanese Lead Metallurgy

With the introduction of Western methods of removing impurities from lead ores, refined lead production in Japan increased tenfold in the 15 years before her military collapse, according to a U.S. Bureau of Mines report describing lead metallurgical practices in Japan. Actual production of refined lead jumped from 3227 tons in 1925 to 38,048 tons in the peak war year, 1944. In 1945 production dropped to 12,468 tons. A number of refining plants were damaged by American bombing.

Two smelting and refining plants, one at Kamioka, and the other at Hosokura, were responsible for two-thirds of the total lead output of Japan proper. Other plants are located at Aizu, Murakami, Ashio, Chigirishima, Takehara, and at Sagami. These plants also treated a considerable bulk of scrap metal. A description of the metallurgical methods used at each of the eight plants and production figures are presented in the report.

More than 90 per cent of Japanese refined lead has been produced by the Betts electrolytic process, which was introduced at the Hosokura plant in 1937. Used also in British Columbia, this process has proved suitable for treating lead containing bismuth and such impurities as antimony, arsenic, copper, gold and silver. The Parkes and Harris processes also were introduced in the '30's and used successfully.

Japanese lead reserves, known and probable, are estimated at about 268,000 tons of metallic lead, according to the U.S. report. The report contains a bibliography, maps and charts and is supplied free from the bureau of Mines, Publications Section, Forbes Street, Pittsburgh 13, Pa.

INCREASING CORROSION RESISTANCE

Recent Tests with Stainless Steels

By H. SEYMOUR

MUCH valuable work has been done recently on stainless steels, particularly the 18:8 variety, to increase their resistance to corrosion, and to make them available to a larger number of industries where the corrosion problem is severe.

The corrosion resistance of stainless steels is usually attributed to "passivation" of the surfaces of these materials. A "passive" surface is one that exhibits "noble" characteristics or practical immunity to attack by corrosive environments, as compared to the substantial corrosion that occurs on an "active" surface.

Briefly, a passive alloy shows much better corrosion resistance than the electromotive series positions of the constituent elements would indicate. For example, the position of chromium in the e.m.f. series indicates poor corrosion resistance, yet chromium is the major element contributing to the corrosion-resistant properties of the stainless steels.

Several explanations have been advanced concerning the nature of mechanism of passivity of stainless steels. The most widely accepted theory suggests the formation of an oxide, such as chromium oxide, on the surface of the metal and the protection of the metal by this oxide from corrosion. Another theory assumes that chemically absorbed oxygen forms a protective layer on the metal surface. Little or no proof has been found, however, to allow definite acceptance to be given to these theories.

Passivation Treatment

Investigations have shown that 18:8 stainless steel becomes passive because of a physically adsorbed gas. At room temperatures specimens of this alloy display passivity upon exposure to air and lose passivity when exposure is reduced.

This process is reversible in that the alloy can be passivated, broken-down, and re-passivated by alternate exposure to air and vacuum.

The ready breakdown of passivity under vacuum at room temperature indicates weak bonds between the gas and the metal which, in turn, indicates physical adsorption. Oxides or absorbed gases would be considerably harder to remove or break down, and this would probably require an elevated temperature.

Several passivation treatments were tried during the preliminary phases of this study. The treatment found most effective, based

on corrosion tests, is the one which is designated as the sulphuric-air treatment. It consists of exposing a specimen of 18:8 to boiling 10 per cent sulphuric acid for 3 minutes, washing thoroughly in water, and then exposing the specimen to air. Similar results are obtained if hydrochloric acid is used. Removal by corrosion of a small amount of metal from the alloy, followed by exposure to air, was found to be an effective passivation treatment several years ago. Incidentally, this situation probably accounts for many of the apparent inconsistencies in the data resulting from corrosion tests on stainless steels and stainless alloy in sulphuric acid and some other media.

Electron Diffraction Tests

Passivated 18:8 surfaces have been investigated by electron diffraction in an attempt to find crystalline oxides. Electron diffraction patterns gave no evidence of their existence, and these experiments are considered as indirect evidence that passivity is due rather to an adsorbed gas. Electron diffraction does show, however, a diffuse and unidentified pattern which may be a hydrous oxide of nickel or chromium. This material may be of assistance in providing a surface that readily adsorbs gas.

Passivation of stainless steel equipment by exposure to warm dilute nitric acid is quite a common practice in industry. Numerous tests using this passivation treatment suggest that this treatment does not passivate stainless steel. It is a fruitless operation and a waste of money as far as passivation benefits are concerned and students of corrosion are rapidly adopting this viewpoint.

The nitric acid treatment may be of some benefit in removing iron particles that may have been embedded in the surface of the metal during rolling or other fabrication operations. This, however, is not a passivation effect and if the metal is pickled after rolling or forming, which is often the procedure, the nitric acid treatment is a superfluous operation.

The usual mill operation of pickling should be considerably more effective than the nitric acid treatment by the fabricator or user, so far as passivation is concerned. Pickling doubtless dissolves some of the metal surface, and the pickling operation is normally followed by washing and exposure to air. In other words, a pickling operation in the steel mill is somewhat similar to the sulphuric-air passivation treatment.

The austenitic stainless steel commonly designated as 18:8 is a relatively soft material in the annealed condition, and it can be hardened or strengthened only by cold working methods. If it were possible, by heat treatment alone, to harden steel, having approximately the corrosion resistance of 18:8, a very desirable situation would develop, particularly in cases where high strength and hardness and/or resistance to wear, galling, or seizing are required.

In addition, the fields of application of this type of material could be greatly expanded because it could be used in shapes and equipment that are not readily amenable to cold working. In general, cold working is applied to only such shapes as wire, sheets, tubing, and strip.

Tensile Strengths

Investigations of heat-hardenable or age-hardening 18:8 type steels was started some few years ago, but it was not until recently that a material of this type became commercially available. The nominal composition of this alloy is as follows: 17 per cent Cr, 7 per cent Ni, 0.7 per cent Ti, 0.2 per cent Al, 0.07 per cent C, 0.5 per cent Si, 0.5 per cent Mn, 0.01 per cent P, and 0.01 per cent S. It could be described as a "starved" 18:8 containing titanium and aluminium with titanium as the principal hardening agent. In the soft or solution-annealed state it shows a tensile strength of 120-150,000 lb. per sq. in., an elongation of 8-14 per cent, and a hardness of 235-270 Brinell. The material is precipitation-hardened or age-hardened by holding at 950°F. or a little higher, and then cooling in air. The hardened material shows a tensile of 195-255,000 lb. per sq. in., and elongation of 8-14 per cent, and a Brinell hardness of 370 to 460.

Adaptable Alloy

This alloy can be produced in cast or wrought form. The alloy parts could be rough-turned or even machine-finished before the hardening treatment, since little oxidation occurs at the ageing temperature involved. Stainless electrodes are produced for welding this alloy which is ferritic or magnetic in the age-hardened condition and austenitic or non-magnetic at elevated or annealing temperatures. The material precipitation-hardens because the hardening constituents are soluble in austenite and comparatively insoluble in ferrite.

The hardened stainless alloy is not as resistant as annealed 18:8 to severe corrosion conditions, but for the milder services the two materials can be considered equivalent so far as corrosion is concerned. This situation is fortunate from the corrosion standpoint, when one considers that the new

stainless steel was developed primarily for high strength purposes.

Corrosion tests in sea water, salt spray, various atmospheres, hydrogen sulphide gas, sulphur dioxide gas, and hot milk indicate no essential differences in corrosion resistance between the new stainless and 18:8. The former did not show susceptibility to intergranular attack in a modified Strauss test (boiling solution of copper sulphate and sulphuric acid) although the new alloy in the precipitation-hardened state is considerably inferior to annealed 18:8 in the boiling 65 per cent nitric acid test. The boiling 65 per cent nitric acid test does not, however, indicate the corrosion resistance or applicability of the material for service in other corrosive media, including nitric acid at lower concentrations and/or temperatures.

The effect of age-hardening on the erosion-corrosion resistance of the new stainless steel should be of great interest. It is generally assumed that a hard material should show better performance than a softer material under conditions of erosion-corrosion, provided both materials exhibit about the same corrosion resistance to a given solution under static conditions. This assumption may not hold true in many instances and may be an entirely erroneous assumption, particularly under fairly corrosive conditions.

Acid Tests

Several tests have been made on annealed and hardened stainless alloy in 1 per cent, 5 per cent, and 10 per cent sulphuric acid at 125°F. Practically no difference was found in the 1 per cent solution but in the two stronger acids the rate of attack on the hardened material was much greater. These results should be regarded as preliminary, and additional experiments will have to be made. In all the tests the specimens were exposed to the acids moving at high velocity.

"LION BRAND" METALS AND ALLOYS

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ESTABLISHED 1869

SOUTH AFRICA'S NEW INDUSTRIES

Development of Synthetic Resin Processes

A WIDE range of synthetic resins, emulsions and raw materials to supply the needs of the paint, plywood, paper, electrical, building, leather and allied trades is to be manufactured in South Africa. A site has been acquired by a new company, Poly-Resin Products Ltd., which expects to begin production within a few months. The latest types of stainless steel plant are being installed, and a trained staff is being brought from Britain to supervise production and to supply technical service to all users of the materials.

* * *

The Rely Paint and Metal Works, Ltd., Cape Town, is now producing a new type of white underwater paint, employing synthetic resins, which is expected to compete successfully with other ships' bottom paints normally used. The paint has been subjected to preliminary tests in local waters and further extensive tests are to be carried out. A new plant is being installed in the Cape Town factory of this company and it is estimated that if the synthetic resins are available an output of about 3000 gal. a day will be possible.

* * *

Although cement production in the Union is being augmented by monthly shipments from overseas, supplies continue to be critically scarce throughout South Africa. All importations into the Union are fixed by Government allocation, which permits a monthly acceptance of 20,000 tons. Building Control officials are understood to have asked the Government for an increased allocation. Shipments are principally from Britain, America and Belgium. Imported cement costs 7s. 9d. for 110 lb., against the home price of 4s. 3d. for 98 lb.

* * *

South Africa may ultimately have more than one plant in operation for the production of synthetic petrol and aviation fuel from coal. It is believed now that African Explosives and Chemical Industries, which employs much overseas capital, may in the future set up a synthetic fuel plant. The production of 60 million gal. of petrol a year is contemplated by the industrial group now planning to set up a synthetic plant at Vanderbijl Park. This plant, however, will not reach the production stage until the end of 1950.

* * *

South African capacity for the manufacture of superphosphates is expected to reach approximately 600,000 tons early next year; the manufacture of nitrogenous fertilisers, is

also to be extended. The industrial group which now produces most of the country's requirements of chemical fertilisers is largely extending its plant at Umbogintweni, near Durban, and at Somerset West, Cape, the increased production of which is likely to be in excess of South African needs and to permit the exportation of substantial tonnages to adjacent countries.

* * *

Because they are cheaper, efficient and much easier to obtain, soya beans are largely replacing meat as a medium for bacteriological research at the South African Institute for Medical Research. Soya beans so closely resemble meat in certain properties that nearly all bacteria will grow on a solution specially prepared from them. The beans are also effective as a medium for propagating specimens taken from a suspect, when ordinary diagnosis is difficult.

* * *

Hydrolysed protein from whale-meat and beef, which has been proved of considerable nutritional value, will probably be manufactured on an extensive scale in Natal and exported in large quantities during the coming years to alleviate acute food shortage in some parts of Europe. The entire plant for the process, evolved by Col. Watkins Pitchford in Natal, has been bought from the South African Red Cross Society by Mr. Michael Ostrowiak, a Durban industrialist, for £2500. Hydrolysed protein which has been produced includes a wine, malt sandwich spread, biscuits and a powdered extract.

* * *

Research by the laboratory division of the Johannesburg Public Health Department has lately enabled valuable advice to be given to certain small-scale manufacturers, based on studies by the municipal chemists. This is revealed in the annual report of the Johannesburg city engineer for 1947, which records that one of the problems solved was the treatment of scum on the surface of settlement tanks into which industrial waste water was led. This seriously impeded the work of the municipal disposal plant. A report by Mr. J. A. McLachlan, of the laboratory staff, which is contained in the city engineer's report, states that laboratory tests showed that this "blanket" scum, was formed of soluble nitrates discharged during the manufacture of white lead, and a percentage of insoluble lead carbonate. Manufacturers were then advised how these nitrates could be recovered and used to make agricultural fertilisers, by evaporating and crystallising the dissolved salts.

American Chemical Notebook

From Our New York Correspondent

THE third and final production unit of the new plant of the Calco Chemical division of the American Cyanamid Company at Willow Island, West Virginia, has now been completed and is already in operation, the company announced last week. The new unit will produce melamine, derivatives of which are used in many industries, including paint, varnish, plastics, paper and textiles. Other derivatives to be made at the new plant are Melmas, used in the production of durable and lightweight tableware, and Lanaset, for the treatment of woollen fabrics to control shrinkage.

* * *

A move which raised to one level the price of electrolytic nickel in three principal markets (U.S.A., Canada and the U.K.) was announced last week by the International Nickel Company, which stated that the American contract price for electrolytic nickel from the Ontario refinery of the company would be immediately increased from 33½ to 40 cents a lb. in all three markets. Mr. Robert C. Stanley, chairman of the company, said that the increased pre-war demands for metal had placed such a drain on the ore reserves of case-metal producers that they were forced to mine lower grade ore. Increased operational expenses had resulted in higher selling prices.

* * *

The characteristics of Thiokol, the flexible synthetic rubber showing high resistance to gasoline, oil, ink, paint and most chemical solvents, so that it serves equally well in printing rollers and in paint spray equipment or aircraft fuel systems, were described at the two-day meeting in Los Angeles, California, sponsored by the American Chemical Society's Rubber Division and the Los Angeles rubber technicians. It was suggested by Mr. Walter E. Boswell, of the Thiokol Corporation, that the special characteristics exhibited by Thiokol PR-1 are such that it could be advantageously used in most rubber applications where the ultimate in solvent resistance was required. He said that Thiokol ages well because of its ability to withstand the harmful effects of sunlight, air, oxygen and ozone. The new synthetic rubber remains flexible over a wide temperature range, is pliable at -45°F. without a plasticiser or softener, and it does not melt at high temperatures. It is not recommended, however, for long use at temperatures above 212°F.

It was reported by E. I. Du Pont de Nemours & Co., Inc., at the end of June, that 94,244 different investors held stock in the company. This represents an increase of 821 over the number of holders recorded at the close of the first quarter of this year, and an increase of 2706 over the number of holders on June 30, 1947. There were 76,687 holders of common stock and 23,627 holders of preferred stock at the end of the second quarter of 1948, including 6070 holders of more than one kind of stock. More than 43,900 holders were women.

* * *

"What's New for the Laboratory," Number Five, has just been released by Scientific Glass Apparatus Company, Inc., 49 Ackerman Street, Bloomfield, New Jersey. The new twenty-page booklet describes recently introduced new equipment and instruments including electronic temperature control equipment, Todd silent burner, immersion heaters (fused quartz), laboratory mixers, precision ovens, electronic cycle timer, utility ovens, Dewar flasks, etc. Copies of the booklet may be obtained upon written request to the company.

* * *

The Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois, has just released Technical Bulletin No. 11, "Alkanesulphonic Acids" describing varied commercial applications of the materials which until now have not been commercially available. The metal salts of the acids, including those of barium and lead, are of interest in the rapid electro-deposition of metals. The acids are solvents for many complex high molecular weight compounds and are effective catalysts for esterification, polymerisation, condensation, alkylation and other organic reactions. These lower alkanesulphonic acids should not be confused with conventional sulphonic acids from petroleum sources as sulphonates.

U.S. Wheat Production.—U.S. farmers are being urged by the Department of Agriculture to aim at a production level of 1100 million bushels (60 lb.) of wheat during 1949. The new target figure represents a decrease of about 8 per cent on this year's crop, but domestic and export demands will still be met.

Technical Publications

THE introduction to Information Bulletin No. 14 (The Aluminium Development Association) "Anodic Oxidation of Aluminium and its Alloys" begins with a brief historical note, then describes the mechanism of the formation of the anodic film, the effect of alloying elements on the current density and appearance of the film, and the special problems connected with anodising of castings. The chromic acid, sulphuric acid and oxalic acid processes are separately described. A special section deals with the dyeing of anodised aluminium, and the suitability of films for dyeing. Elsewhere an account is given of dyeing with inorganic salts, the production of special effects including multicolour effects, direct printing and photographic processes. Copies are obtainable from the Aluminium Development Association, 33 Grosvenor Street, W.1.

* * *

Among a number of useful contributions in *Fuel Efficiency News*, July (Ministry of Fuel and Power), is a note on the Fuel Efficiency Advisory Service, a wartime organisation now established on a permanent basis with regular personnel. These experts have a wide range of knowledge of fuels and their applications. The Service, with a H.Q. at Queen Anne's Chambers, S.W.1, is to maintain close contact with industrial research associations. The steam engine, which the *News* contrasts with the old soldier—"it dies but never fades away"—is described as a potentially heavy user of steam, particularly with advancing age. It is suggested that the regular use of the engine indicator will lead to greater efficiency and offer other important information. Illustrations of "Bad Practice—Good Practice" in furnaces fired by producer gas will have useful applications.

* * *

The newly issued yearbook of the American Bureau of Metal Statistics—the 1947 edition—contains a wide collection of statistics dealing with production, consumption, stocks, imports and exports, etc., of copper, lead and zinc. The book also contains the usual data on tin, aluminium, antimony and some of the minor and precious metals, including gold and silver. It contains, for the first time, statistics of copper production, shipments and stocks, reported by the Copper Institute, and consumption, stocks, etc., reported by the U.S. Copper Association. The book is distributed by the ABMS, 33 Rector Street, New York 6, N.Y. (\$3.00 post free).

The Dominion Water and Power Bureau, Mines, Forests and Scientific Services Branch, Department of Mines and Resources of Canada, has published volume 96 of the Water Resources Papers dealing with the surface water supply of Canada. This number contains the results of investigations by Dominion Hydrometric Survey during the climatic years October 1, 1942, to September 30, 1944, in the Provinces of New Brunswick and Nova Scotia. It contains 70 pages of stream flow data for rivers and streams within the area and with rainfall records for these two years at a number of places in the Maritime Provinces. (Receiver General of Canada to the Controller of the Dominion Water and Power Bureau, Department of Mines and Resources, Ottawa, Canada, 50 cents.)

* * *

Almost everything a prospective user of the Parker steam engine needs to know—it is said that users may be found almost anywhere from "Chester to Chittagong"—is to be found in a 44-page booklet entitled "The Parker Engine." In addition to photographs of actual installations, there is a useful chapter for buyers, to which is appended blue-prints of single, two, and three-crank compound engines. Copies are available from Ashworth & Parker, Ltd., Bury.

* * *

"Koppers Diamyl Phenol" is the title of a new bulletin, No. C-3-110, just issued by the chemical division of the Koppers Company, Koppers Building, Pittsburgh 19, Pa., which in 24 pages describes the properties, uses, and reactions of diamyl phenol, source of additives for lubricating oils, plasticisers, and chemicals for the rubber industry. Physical and chemical properties of the compound are fully described, and a bibliography of 104 references is included.

* * *

The sealing of porous castings by a vacuum process of impregnation, perfected by the Pulsometer Engineering Co., Ltd., Reading, forms the subject of the firm's June leaflet (No. 0930). The impregnation method has been successfully applied to bronze, gunmetal, steel and cast-iron and the pamphlet contains micro-photographs of bronze castings before and after application of the process.

Personal

AMONG those who received the honorary degree of Doctor of Laws at a graduation ceremony in the University of Glasgow last week was **PROF. ROBERT JACK**, Professor of Physics and Dean of the Faculty of Science at the University of Otago. A graduate of Glasgow University and the University of Göttingen, he received his early training as a teacher in the Queen's University, Belfast.

The award of the George Medal to **MR. HUGH EDMUND WATTS**, chief inspector of explosives at the Home Office since 1945, was announced this week. The award recognises his courage and skill in opening and rendering safe the 22 explosive letters and packets sent to prominent figures in this country since 1945. Mr. Watts, a Fellow of the Royal Institute of Chemistry, has studied explosives since the first World War, joined the Home Office in 1924 and became a second inspector of explosives in 1931.

The first Canadian to be accorded the honour, **MR. T. W. SMITH**, of Canadian Industries, Ltd., Montreal, has been appointed one of the two Jubilee Memorial lecturers of the Society of Chemical Industry for 1948. The distinction which has been conferred on some several outstanding personalities in the field of industrial chemistry, involves the delivery of lectures before at least two of the sections of the international organisation. Mr. Smith, who was recently elected president of the Chemical Institute of Canada, plans to deliver a lecture in the autumn before the Canadian section and later before the U.S.A. section in the United States.

Wills

MR. CHARLES H. LEONARD, the first to extract petrol from petroleum, left £551,780 (duty £294,179).

SIR WILLIAM MURRAY MORRISON, of Bramham Gardens, S.W., late vice-chairman of the British Aluminium Co., Ltd., left £75,199.

SIR HENRY BEYER ROBERTSON, chairman of Brymbo Steel Co., Ltd., Wrexham, and a director of several other companies, left £167,695 (£100,540 net).

MR. JAMES GREENHALGH, principal of Standard Fireworks, Ltd., Huddersfield, who left £87,843 (£35,676 net), bequeathed the residue of his estate or £10,000, to the Bishop of Wakefield's Fund for the churches of the diocese.

Personal

Obituary

DR. WILLIAM CARRICK ANDERSON, formerly senior assistant lecturer in metallurgical chemistry at Glasgow University, has died at his home, Gateside, Blanehead, age 76. He was awarded the degree of D.Sc. at Glasgow University in 1899 for research on the chemistry of coal and was the author of numerous articles on timber and stone preservation and metal corrosion.

PARLIAMENTARY TOPICS

Supply of Drugs.—In reply to a motion by Mr. E. P. Smith, which proposed annulling the Poisons (Amendment) (No. 2) Rules, 1948, Mr. Younger said it had been necessary to take account of the legitimate needs of doctors and patients, and the relaxation of the rules was made necessary because other regulations had been greatly tightened up. When dangerous drugs were supplied in emergencies, it was necessary to rely on the common sense of the pharmacists concerned. The motion was withdrawn.

Drugs and Chemicals.—Mr. Platts-Mills asked the President of the Board of Trade what action he proposed to take on the resolution passed by the annual meeting of the Socialist Medical Association calling upon the Government to set up a working party within the drug, chemical and allied industries. Mr. Belcher: I am not satisfied that a working party of this description would serve any useful purpose.

Coal Tar Plastics

In a recent article dealing with the work of the Chemical Research Laboratory (DSIR) in the plastics field (*THE CHEMICAL AGE*, July 3) mention was made of the difficulty of avoiding duplication of research work. In this connection it was stated that while a patent application covering polymers and copolymers of acenaphthylene was in course of preparation, a prior specification (British Patent Application No. 24441/45) which covered the same ground became open to inspection at the Patent Office.

It is now learned from the DSIR that this patent which anticipated the CRL's discovery, was based upon American research and there was, therefore, no duplication of British efforts.

Descriptive illustrated matter just issued by Brookhirst Switchgear, Ltd., Chester, affords all essential technical and commercial information about the 759 block push button control and the 753 snap action switch, both of which can be employed on either single or duplicated circuits.

Home News Items

Token Imports from Norway.—The Board of Trade announces that Norway has now been added to the list of countries participating in the Token Import Scheme. Countries already participating are Australia, Belgium, Canada, Denmark, Finland, France, Holland, India, Italy, Luxembourg, Pakistan, Sweden, Switzerland, and the U.S.A.

Mr. Bevan's Praise for Pharmacists.—The Minister of Health, Mr. Aneurin Bevan, paid a tribute to the Pharmaceutical Society when he was the Council's guest at their monthly dinner, on July 27. They had always got on well together, he said, and discussions with the pharmaceutical profession on the National Health Service had been more more fruitful than with any other branch of the medical world.

Mechanical Handling Exhibition.—Attendance at the Mechanical Handling Exhibition and Convention at Olympia, which closed on July 21, totalled 4000 a day. Large contracts are stated to have been placed by the GPO and the Finnish Post Office and an initial order for contractors' plant valued at £50,000 was received from the Argentine. Many items of equipment were also sold for Colonial development schemes.

Calcium Carbide Prices Raised.—The Director of Sundry Materials, Board of Trade, 10 Old Jewry, London, E.C.2, announces that the price of calcium carbide distributed through the Carbide Distributing Agency, Ltd., Carbide House, 55 Gordon Square, London, W.C.1, has been increased by £1 15s. per ton from August 1. Prices will then be: 4 tons and over £30 per ton; 4 cwt. and over £31 15s.; under 4 cwt. £32 15s.

Another Scottish Industries Fair.—Preliminary answers to questionnaires distributed through Chambers of Commerce in Scotland show that 340 firms would consider taking space in the proposed Scottish Industries Fair next year, and 207 of those firms are in favour of Glasgow as a centre for the exhibition. The Scottish Council (Development and Industry) estimated such an exhibition could be run in the Kelvin Hall, Glasgow, in autumn next year for three weeks at a total cost of about £40,000 and that a charge of 10s. to 12s. 6d. per square foot of space, exclusive of the cost of stands, would clear expenses.

Undergraduates in Industry.—Fifty-six university students are working in Dunlop factories during the long vacation. They come from 19 universities in the United Kingdom, Belgium, Denmark, Finland, France and Sweden. Most of them are doing temporary staff jobs, but a few who want factory experience are working as operatives. They are paid the rate for the job.

Science and Agriculture.—Sir John Boyd Orr accepted an invitation to address the Parliamentary and Scientific Food Committee last week on "Science and Increased Food Production in Great Britain and the Colonial Empire". Science and agricultural production was one of the subjects scheduled for discussion by the committee, which also dealt with paper supply for scientific books and journals and a draft memorandum prepared by Mr. F. J. Erroll, M.P., on the use of steel.

Scottish Lime and Cement Production.—In an attempt to increase the domestic production of lime, a committee appointed by the Scottish Council (Development and Industry) is investigating the commercial utilisation of substantial limestone deposits in Midlothian, Banffshire and the West Highlands. Efforts are also being made to develop the country's cement industry, with a view to self-sufficiency.

Business as Usual.—Although proofing and dyeing machinery was lost in a fire which broke out early on July 19, at their Cobden Street works in Pendleton, Salford, J. Mandleberg and Co., Ltd., are to work night shifts. Mr. C. W. Bancroft, managing director, described the severe damage to the machinery and building as "inconvenient, but we have other proofing machines, and by working shifts we can maintain production."

Sale of War Factory Opposed.—Strong public opposition was expressed at a Morecambe public inquiry on July 28 when the Ministry of Supply sought approval for the sale of a £10 million war factory at Middleton, near Morecambe, to I.C.I., Ltd., and Shell Mex. The sale was opposed by near-by residents who anticipated that noxious smells, smoke and dirt would be caused. Morecambe Corporation, Lancaster Corporation, Lancaster R.D.C. and a number of individuals opposed the application.

Overseas News Items

Argentina to Use Shale Oil.—Because of shortage of fuels in Argentina, petroleum in particular, it is planned to exploit oil shale deposits in the Mendoza province where very large reserves exist.

Rubber Estates Destroyed.—Military sources in Java report that the estates of the Anglo-Java Rubber Company have been totally destroyed. The estates consist of 8940 acres, of which 1281 are planted with coffee and the balance with rubber.

U.S. Aid for China.—A total of \$72,795,000 is available in economic recovery funds for China during the July-September quarter, the Economic Co-operation Administration has announced. The funds will be used for the purchase of foodstuffs, capital equipment, petroleum, fertilisers and cotton.

International Ceramic Congress.—The 1948 International Ceramic Congress will be held from September 12 to September 17 in Maastricht and Scheveningen, Holland. The inaugural session is to take place in Maastricht, the final session in Scheveningen.

French African Phosphate.—The monthly average figure for French North Africa's phosphate production rose from 406,362 tons in 1946 to 451,268 tons last year. This compares with 342,120 tons in 1938. The monthly export averages have risen correspondingly.

Solid Motor Fuel.—A French expert is reported to have developed a solid motor fuel which contains water glass, alginic acid, casein, methyl cellulose, together representing 3 per cent of the total. The new product is claimed to have great advantages as regards transport and storage.

French Iron and Steel Research.—The Institut de Recherches Siderurgiques is to be established in Saint Germain-en-Laye near Paris. The functions of this Institute, which is expected to have a staff of about 100, are described as similar to those of the British Iron and Steel Research Association.

Oil Company Officials Arrested.—Two British officials of the Unirea Oil Company, Mr. E. Boden, general manager, and Mr. R. L. Wilson, refinery manager, were arrested in Rumania last week. Mr. Wilson was released after protests by the British Consul, but his colleague is still held. No charges have then been preferred.

French Fertilisers for Eire.—According to a recent trade agreement between France and Eire, the latter is to receive some 180,000 tons of chemical fertiliser and 8000 tons of cement.

"Science Serving Death."—Members of the French Scientific Workers' Association have passed a resolution calling for "increased efforts to prevent science serving death" and declaring that the responsibility for the use made of his work rests solely with the scientist.

U.S. Metal Congress.—The 30th annual National Metal Congress and Exposition will be held in Philadelphia for five days beginning Monday, October 25. Meeting simultaneously with the American Society for Metals will be the American Welding Society, the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers and the Society for Non-Destructive Testing (formerly the American Industrial Radium and X-Ray Society).

France-Netherlands Chemical Exchange.—The recently concluded one-year trade agreement between France and the Netherlands provides for the export of the following French chemicals, metals, etc.: phosphates 400,000 tons, iron-ores 400,000 tons, magnesium chloride 600 tons, dyes 300 tons, sera and pharmaceutical products to the value of 100 million francs, textile and leather auxiliary products 10 million francs and various chemicals 100 million francs. Holland is to send a number of chemicals, chiefly organic products.

U.S. Interests in Columbia and Chile.—Agreement has been reached between the Chilean Government and the Chile Exploration Company, a subsidiary of the Anaconda Copper Mining Company, U.S.A., regarding the installation of a new plant at Chuquicamata for the production of sulphide ores. It is stated that the new plant will cost \$6 million, approximately one-half of which will be expended in the first four years. In addition, a Colombian Government delegation is at present visiting the U.S.A. in connection with the exploitation of iron-ore deposits at Paz del Rio in the Department of Boyacá.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—allowed by the date of the Summary, but such total may have been reduced.)

METAL CHEMICAL FINISHES (LIP-HOOK) Ltd. (M., 7/8/48).—July 1, £250 deb., to Nujoy Products Ltd., general charge. *Nil. May 7, 1948.

KUALA KUBU RUBBER ESTATE, LTD. London, E.C. (M., 7/8/48).—June 25, \$58,000 (Straits dollars) mort., to Industrial Rehabilitation Finance Board, Kuala Lumpur; charged on property known as Kuala Kubu Estate 3rd Mile Batang Kali, Ulu Yam Road, Selangor. *Nil. Dec. 9, 1947.

Satisfactions

SOLENT PORTLAND CEMENT CO., LTD. Herne Bay (M.S., 7/8/48).—Satisfactions June 29, of charge registered Jan. 22, and of mortgage registered Feb. 28, 1940.

S. WEST, LTD. Leicester, manufacturing chemists. (M.S., 7/8/48).—Satisfaction July 1, or deb. registered June 24, 1947, to the extent of £100.

Company News

The nominal capital of **H. Gelpke, Ltd.**, 1 Leadenhall Street, London, E.C.3, has been increased beyond the registered capital of £10,000 by £5000 in £1 shares.

Dufay-Chromex, Ltd., have decided to postpone the decision regarding payment of a dividend on the £180,000 6 per cent cumulative first preference shares which were payable on August 1, until the audited accounts for the group for year to September 30, 1948, are available. For the year 1946-47, no dividend was paid on either the £100,000 6 per cent redeemable non-cumulative second preference shares or the £718,622 ordinary, but 10 per cent, less tax, was paid on the ordinary for each of the two previous years.

New Companies Registered

The X-ray research and production interests of **Metropolitan-Vickers Electrical Company** are associated with the **Victor**

X-ray Corporation and Newton & Wright in a new company to be named **Newton Victor**. It will be devoted wholly to the design, manufacture, distribution and servicing of X-ray and electro-medical equipment.

Eliminax, Ltd. (457,320).—Private company. Registered July 17. Capital £5000. Manufacturers of degreasants, dispersants, solvents and compositions for the removal of oil, grease, rust, carbon and all corrosives from metal, etc. Directors: Cecil B. Jones and May Oldham. Regd. office: 84, 85 and 86 Chancery Lane, W.C.2.

Insecta Laboratories, Ltd. (457,301).—Private company. Registered July 16. Capital £1000. Industrial, domestic and agricultural pest controllers, chemists, etc. Directors: Miles D. Price, Geo. S. Monks and Manon Shaw. Regd. office: 159 Victoria Street, S.W.1.

Charman Commercial Services, Ltd. (457,181).—Private company. Registered June 30. Capital £100. Dealers in soaps, oleaginous compounds, adhesives, synthetic products, etc. Directors are: Ronald E. G. Charman and Vida F. B. Charman, both of 10 Round Hill Crescent, Brighton.

Scottish Diatomite, Ltd.—Private company. Capital £25,000 in £1 shares. To develop and exploit diatomite deposits on the island of Skye. Subscribers: Major-General Harry MacDonald, Redcliffe, Portree, Skye; Robert Parry, Hugh B. Millar, and W. R. M. Murdoch (solicitor), all of Glasgow.

Synthelene, Ltd. (457,143).—Private company. Registered June 30. Capital £100. Objects: To carry on the business of manufacturers of and dealers in lacquers, polishes, varnishes, paints, etc. Solicitors: R. J. Twyford & Co., Salisbury House, E.C.2. Regd. office: 529 Salisbury House, London Wall, E.C.2.

Chemical and Allied Stocks and Shares

HOLIDAY influences have held stock market business in check, and earlier in the week, buyers were very cautious pending fresh news of the Berlin situation. Exceptionally, however, British Funds have been in demand, particularly the nationalisation stocks, gilt-edged responding readily to moderate "safety-first" buying and a certain amount of switching from short-dated into long-dated stocks.

Chemical and allied shares moved narrowly, Monsanto Chemicals 5s. ordinary changing hands around 58s. 1½d., and Laporte Chemicals 5s. units around 20s.

Burt Boulton & Haywood marked 27., Albright & Wilson were 28s., Fisons 57s. 6d., British Drug Houses 5s. ordinary 8s. 6d. and Greeff Chemicals Holdings marked 14s. 3d. British Glues 4s. ordinary were around 19s. following publication on the full results and now yield $5\frac{1}{2}$ per cent on the basis of last year's 25 per cent dividend. In his annual statement the chairman mentions that he looks forward to substantial and profitable expansion of the company's interests in Canada.

Turner & Newall were 74s. 6d. with which there is a yield of 4 per cent, the strong balance-sheet position being generally recognised and also the possibility of higher dividends when the voluntary dividend limitation plan is finally removed. United Molasses were 47s. 6d. and yield rather more than $4\frac{1}{2}$ per cent, while Imperial Chemical have changed hands actively around 46s., and now also yield approximately $4\frac{1}{2}$ per cent, a not unattractive return for a leading industrial, particularly as the directors have indicated that they anticipate being able to maintain the 10 per cent dividend on the larger capital. British Oxygen strengthened to 96s. 10 $\frac{1}{2}$ d. and the 4s. units of the Distillers Co. were 26s. 9d. at which the yield is slightly over 4 per cent on last year's $27\frac{1}{2}$ per cent dividend. Steadiness was shown in Borax Consolidated deferred at 57s. 6d. while British Aluminium at 46s. 9d. have been well maintained, but Dunlop Rubber have eased to 70s. on the other hand, Triplex Glass 10s. ordinary strengthened to 24s. and in other directions, the yield of approximately $4\frac{1}{2}$ per cent drew attention to Ilford 5s. ordinary, which improved to 26s. 3d. Paint shares attracted, it being pointed out that in most cases dividend payments are moderate in relation to earnings, and that there would have to be a heavy fall in profits in future to necessitate lower dividends. International Paint have improved further to $\pounds 7\frac{1}{2}$ on the proposal to "split" the $\pounds 1$ units into five of 4s. each. Indestructible Paint and Lewis Berger have already subdivided their shares, a course which makes for a wider and more active market in them.

There was only moderate business in iron and steels, the good yields failing to attract buyers, although there is every prospect of dividends being maintained with steel production at its present record level, and moreover, it is generally agreed that in any case, nationalisation could not be effected until 1950. United Steel at 27s. 6d. yield over $5\frac{1}{2}$ per cent, the yield on Colvilles at 82s. 9d. is $4\frac{1}{2}$ per cent, while Richard Thomas & Baldwins 6s. 8d. units at 13s. 7 $\frac{1}{2}$ d. return $7\frac{1}{2}$ per cent.

Boots Drug 5s. ordinary were 49s., Beechams deferred 19s., Timothy Whites

34s. 4 $\frac{1}{2}$ d. and Sangers 29s. 6d. in other directions, Lever & Unilever at 48s. 6d. have remained firm on further consideration of the big increase in the past year's profits. Oil shares were inclined to lose ground with Anglo-Iranian only $\pounds 7\frac{1}{2}$, Shell 75s., and Trinidad Leaseholds 30s.

British Chemical Prices

Market Reports

WHILE conditions generally have been quieter, due to the shorter week and to the holiday season in the main industrial centres, the contraction in new business has not been marked and to some extent has been offset by the continual flow of overseas inquiries. There is no lack of interest in the soda products section and there are ready buyers for any available supplies and this position also applies to the potash chemicals. Owing to the reduction in the controlled price of linseed oil the price of ground white lead has been reduced by $\pounds 1$ 10s. per ton. In order to ensure adequate supplies to industries producing goods for export the Board of Trade has made an order, operative from August 4, which places dyestuffs and certain materials used in the manufacture of dyestuffs on the list of goods requiring an export licence. It is understood that this is a precautionary measure to protect the home producing industries and it is hoped that an improvement in output of British dyestuffs will make the order of temporary duration. The position of the coal-tar products remains unchanged and, apart from seasonal influences, the demand continues satisfactory.

MANCHESTER.—This has been one of the quietest trading weeks of the year on the Manchester chemical market. The flow of delivery specifications of textile and other industrial chemicals has been of small scale, and new business in the alkali and other products on home trade account has been on a similar level. The same may be said of much of the overseas inquiry. This interruption is due almost entirely to the holidays and is likely to be of short duration. The demand for fertilisers is at the seasonal low level but there has been moderate movement of tar products.

GLASGOW.—Business has again been quiet in the Scottish chemical market during the past week, due to the continuation of the trades holidays. The supply position of Glauber salts has deteriorated because of the difficulty of crystallisation in hot weather. In the export market conditions have been very active and a number of good orders have been booked. Prices are showing signs of becoming stabilised.

COMPANY MEETING**The Beecham Group****Larger Net Surplus**

THE 20th annual general meeting of the Beecham Group, Ltd., was held on July 28 in London, Sir J. Stanley Hoimes, M.P., chairman and managing director, presiding.

The following is an extract from his statement circulated with the report and accounts:—

The net result of the group's trading for the year ended March 31, 1948, is a net surplus of £751,511 available for dividend on the deferred shares and for reserves, as compared with £502,659 in the previous year. It is proposed to declare a final dividend of 4 per cent, making 40 per cent for the year, the same as last year. The trading profits and sundry revenue earned by the 118 companies and branches of the group amount to £2,370,181 compared with £2,688,522 in the previous year.

Although home sales showed an increase of nearly 18 per cent, the home trading profits have shown a decrease of £208,088, due to the steeply rising costs of raw materials, containers, consumable stores and wages, without any compensating increases in the selling prices of the great majority of our products, except those arising from increased rates of purchase tax.

Our export trade has again shown satisfactory results, in spite of increasing costs.

The total charge for United Kingdom taxation amounted to £1,157,366 compared with £1,565,114.

Our food sales have increased in total by over 25 per cent, while the sales of food-stuffs manufactured and canned by our own factories have increased by 65 per cent, compared with last year. The food side of the group's business, which commenced three years ago with the purchase of C. & E. Morton, Ltd., continues to expand rapidly and has already made, and is likely progressively to make, a not inconsiderable contribution to the group's future prosperity.

During the past year personal contacts have been made with our people overseas. The conferences which we have been able to hold on the spot with our overseas managers have enabled us to obtain a clear picture of local conditions and difficulties and should result in increased trade and profits in the future. The recently formed sales companies in India and Malaya have traded successfully since their inception.

It is difficult to make prophecies with regard to the future, but we have so continually broadened the basis of our business and our interests all over the world are so far-flung that we can face the future with confidence.—The report was adopted.

New Copal Plant**Progressive Engineering Practice at Erinoid**

THE development of the manufacture of Erinite resins is marked by the recently completed installation of the most modern copal gum running and esterifying plant in the country. Two stainless steel kettles, each of 1 ton operating capacity, have been installed by the Aluminium Plant and Vessel Company at the Stroud works of Erinoid, Ltd. The pots are heated by specially designed oil heaters, which cause a circulation of hot gases around the well-lagged pots and provide a most effective heating system.

Both pots are filled with completely modern stirring gear and CO₂ circulating arrangements. The finished batch is discharged into aluminium lined trays in an adjoining building, in which an atmosphere of CO₂ is maintained. All temperatures are thermostatically controlled and during the trial period it has been shown that the plant produces a remarkably high standard of copal resin.

All products are distributed by A. Boake, Roberts & Co., Ltd., which is associated with Erinoid in the production of resins and ester gums.

GOOD LIMESTONE PROSPECTS

SUPPLIES of limestone during the coming twelve months are stated to be sufficient to cover all requirements. This is the effect of an assurance given to the Government by the Limestone Federation.

Earlier in the year, the federation drew the Government's attention to the possibility of heavily reduced production in view of the loss of labour from limestone quarries during the past few years. This situation, the federation had asserted, was likely to be adversely affected by the withdrawal of German PoW labour, by which many of the important centres of production had been keeping up the necessary output of lime and limestone to steel works and other industries. There has since been a marked improvement in the provision of fuel and labour.

For Indian Readers.—Wolters Balances, Ltd., 365-371 Whippendell Road, Watford, Herts, which received an air mail communication on June 20 from certain chemical apparatus distributors in South India, would be grateful if that firm would communicate again by air mail.

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2, at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Manufacturing sulphurous anhydride, alumina and cements starting from sulphate of calcium and materials containing alumina and silica.—J. C. Seailles. Nov. 22, 1939. 602,724.

Production of itaconic acid.—C. Pázer & Co., Inc. Nov. 25, 1942. 602,866.

Aluminothermic and like exothermic processes.—E. Lux. Oct. 23, 1944. 602,731.

Exothermic process.—E. Lux. Oct. 23, 1944. 602,732.

Azo dyestuffs.—Manufactures de Produits Chimiques du Nord Etablissements Kuhlmann. Dec. 31, 1941. 602,878.

Processes and compositions for the electrodeposition of indium alone or with other metals.—Indium Corporation of America. April 19, 1944. 602,879.

Process for the hydrogenation of aromatic nitro compounds.—Standard Oil Development Co., and J. C. Arnold. May 25, 1945. 602,880.

Manufacture of aqueous emulsions for insecticidal purposes.—J. R. Geigy A.G. June 2, 1944. 602,747.

Processes for the sulphonation of heterocyclic compounds.—Pyridium Corporation. July 7, 1944. 602,882.

Manufacture of copper phosphide.—Metallo-Chimique, Soc. Anon. May 23, 1941. 602,814.

Cyanuric chloride.—American Cyanamid Co. Jan. 16, 1945. 602,816.

Plant and presses therefor for the extrusion of lead and lead alloys.—British Insulated Callender's Cables, Ltd., and G. T. W. Grieve. Aug. 24, 1945. 602,894.

Manufacture of aryl and alkyl substituted cysteines.—Therapeutic Research Corporations of Great Britain, Ltd., I. M. Hellbron, and A. H. Cook. Sept. 6, 1945. 602,755.

Manufacture of aromatic acyl-sulphonamides.—R. M. Hughes. (J. R. Geigy A.G.) Oct. 24, 1945. 602,934.

Manufacture of heptan-3,4-dione and ethyl propyl acrylic acid.—Distillers Co., Ltd., B. Duval, A. Elce, and K. H. W. Tuerck. Oct. 26, 1945. 602,832.

Saccharification of cellulosic materials.—Usines de Melle. Nov. 10, 1944. 602,833.

Manufacture and production of porous plastic masses from polymerised vinyl compounds.—I.C.I., Ltd., L. J. Cardy, G. T. Gammon, and W. Walker. Nov. 8, 1945. 602,665.

Production of aqueous solutions of polyvinyl acetate derivatives.—I.C.I., Ltd., and R. R. Lyne. Nov. 14, 1945. 602,974.

Gas turbines.—A. V. Gilbert. Nov. 9, 1945. 602,706.

Condensation products of the anthraquinone series.—I.C.I., Ltd., F. Irving, and A. Livingston. Nov. 14, 1945. 602,975.

Compositions adapted for water-repellency treatment of textile fibre.—I.C.I., Ltd. Nov. 15, 1944. 602,976.

Production of catalytically cracked gasoline.—Shell Development Co. Jan. 8, 1945. 602,780.

Method of removing manganese from calcium.—Dominion Magnesium, Ltd. Aug. 17, 1945. 602,910.

Process for polymerising isobutene with other polymerisable substances.—N. V. de Bataafsche Petroleum Maatschappij. April 10, 1943. 602,851.

Overlay metals of aluminium or aluminium base alloy bonded to an iron group metal, or metal base alloy.—Mallory Metallurgical Products, Ltd. Oct. 7, 1944. 602,857.

Oil and like seals.—R. Trist & Co., Ltd., and L. Bomyer. June 4, 1946. 602,792.

Methods of preparing zein solutions directly from gluten.—Time, Inc. Nov. 30, 1942. 604,745.

Softening or plasticising regenerated cellulose pellicle.—G. F. Rayner (Sylvania Industrial Corporation). May 31, 1944. 604,760.

Production of coated sheet material.—Imperial Chemical Industries, Ltd. (E. I. du Pont de Nemours and Co.). December 1, 1944. 604,512.

Manufacture of anhydrous aliphatic carboxylic acids from aqueous solutions thereof.—Usines de Melle. Jan. 13, 1943. 604,760.

Substituted diamines.—Soc. Des Usines Chimiques Rhone-Poulenc. May 24, 1941. (Cognate Application 8033/45.) (Sample furnished.) 604,675.

Method of manufacture of materials required in the electrometallurgy of aluminium.—Compagnie de Produits Chimiques et Electrometallurgiques Alais, Froges & Camargue. April 21, 1942. 604,677.

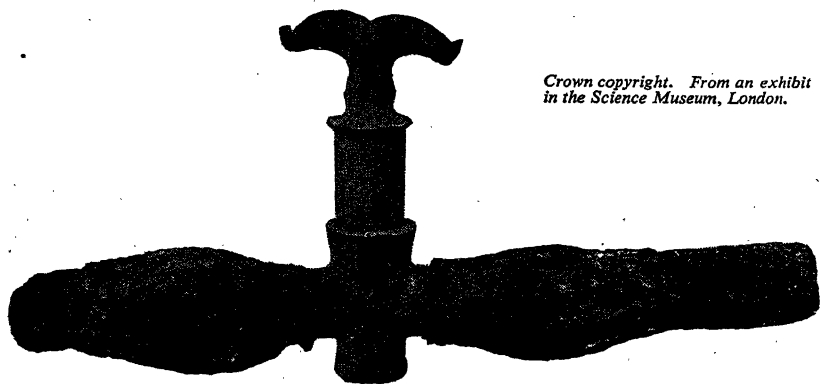
Preparation of substituted ethylene diamines.—Soc. des Usines Chimiques Rhone-Poulenc. Jan. 14, 1944. (Addition to 604,675.) 604,679.

Preparation of substituted diamines.—Soc. des Usines Chimiques Rhone-Poulenc. Aug. 19, 1943. 604,680.

Synthetic resin and process of making same.—T. E. McElhinney. Aug. 9, 1945. 604,599.

Alicyclicdioxibenzthiazole (and selenazole) carbocyanine dyestuffs and a process of preparing the same.—General Aniline & Film Corporation. Aug. 16, 1944. 604,600.

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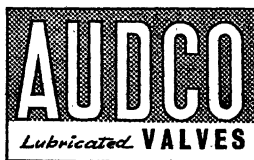
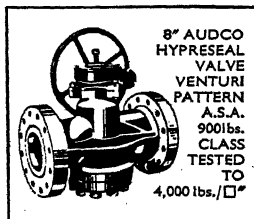
Crown copyright. From an exhibit in the Science Museum, London.

Bronze riveted plug stop-cock on $\frac{3}{4}$ inch (cast round) lead service main, A.D. 1539, Hampton Court Palace.

This stop-cock was installed at Hampton Court Palace circa 1539, and remained in service until 1876, when more modern fittings were inserted.

Into the conical body of the cock fits a similarly coned hollow plug, bored on opposite sides with round ways, giving a clear passage to the water. The plug protrudes from the body both at the top and at the bottom, where the edges of the plug are lightly riveted over to retain it in its working position.

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Trinuclear cyanine dyes.—General Aniline & Film Corporation. Aug. 16, 1944. 604,687.

Emulsifiable hydrocarbon oils and emulsions thereof.—Shell Development Co. Oct. 7, 1944. 604,603.

Process for discharging cupriferric dyeings of direct azo-dyestuffs.—Ciba, Ltd. Oct. 31, 1944. (Cognate Application 26914/45.) 604,690.

Production of sulphonamides.—Soc. des Usines Chimiques Rhone-Poulenc. Nov. 24, 1944. (Samples furnished.) 604,693.

Process for polymerising unsaturated organic compounds.—Shell Development Co. Jan. 9, 1945. 604,544.

Method for the manufacture of hollow bodies in synthetic resin material.—M. J. Maillard. Sept. 3, 1941. 604,556.

Purification of penicillin salts.—Glaxo Laboratories, Ltd., A. E. Bide, W. Graham, E. L. Smith, and P. A. Wilkinson. Nov. 27, 1945. (Cognate Application 4837/46.) 604,563.

Production of polyhaloacyl halides.—Imperial Chemical Industries, Ltd. Nov. 28, 1944. 604,579.

Polymerisation processes.—E. I. du Pont de Nemours & Co. Nov. 29, 1944. 604,580.

Modified synthetic polymeric materials.—E. I. du Pont de Nemours & Co. Nov. 30, 1945. 604,708.

Process and apparatus for the absorption of gas in a liquid.—E. I. du Pont de Nemours & Co., C. V. Herrmann, and L. A. Myers. Nov. 30, 1945. 604,709.

Micrometer measuring instruments.—Challand, Ltd., and S. L. Smith. Nov. 30, 1945. 604,714.

Oxyacetylene installation for welding, cutting or the like.—Volcan, Soc. Anon. July 11, 1945. 604,650.

Aluminium base alloy.—T. F. Bradbury. Dec. 5, 1945. 604,818.

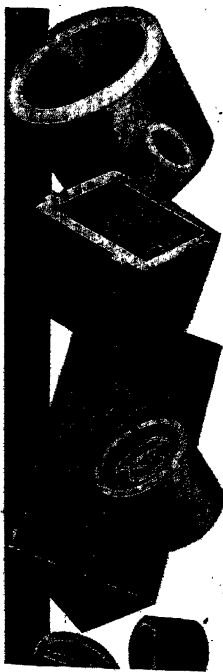
Stabilisation of chlorinated paraffin wax.—Imperial Chemical Industries, Ltd., and P. A. Hawkins. Dec. 5, 1945. 604,830.

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A Bid for Better Coal

THE chemical industry is dependent for most of its operations on coal in the form of power, steam, electricity or the hot products of combustion. It is from that standpoint that the importance of some recent official pronouncements upon the coal position must be assessed. The report of the National Coal Board, with its rather depressing account of the operations of 1947, has been the subject of wide comment. While it contained depressing features associated with the great financial loss, increases in the price of coal, and inability to persuade the miners to increase output regardless of considerable increases in mechanisation, it was also a record of a vast adventure in reconstruction. It reflected at least a promise that the coal industry as a whole will ultimately be run upon the soundest technical lines, when some fundamental changes can be made and a great deal more equipment provided. That promise is not one which can be quickly fulfilled and, even more evidently, no assurance of any kind can be had that the mining force will enable the commendable plans of the board to come to fruition.

A document to which far less attention has been paid is the annual report of the Industrial Coal Consumers' Council which was issued towards the end of July. There can be few works where the coal supplies have not frequently been an invitation to despair. The Industrial Coal Consumers' Council is charged with the duty of considering any matter affecting the sale or

supply of solid fuel which is brought to its notice by consumers; if action appears to be necessary the conclusions of the council are notified to the Minister, who can then take action if he deems it desirable. If a really bad consignment of coal has been received, the report states, "the proper course is to take the matter up first with the supplier and then with the National Coal Board, if necessary. Only if the board fails to give satisfaction and there is a suggestion of unfair treatment or some other question of principle, will the matter be considered by the council. Such reports must be documented and preferably should be made through the consumer's trade association." If the difficulty is one of allocation of supplies, a firm may appeal first to "the regional controller of its parent production department, and any non-industrial consumer to the regional controller, or senior regional officer of the Ministry of Fuel and Power." No one will see in this programme of permissive powers and conditional safeguards any immediate solution of coal users' difficulties, but the creation of remedial procedure does at least recognise the widespread need.

The adequacy of supplies of coal is a matter of the first importance. The NCB has announced that output is falling short of the target set for the mining industry. The Minister informed the country in June that on this account there will be a higher proportion of inferior coal supplied to industrial consumers in this country

On Other Pages

Leader:		<i>Untapped Oil Reserves</i>	213
<i>A Bid for Better Coal</i>	205	<i>Wider Use of Lignite</i>	213
Notes and Comments:		<i>Copenhagen Exhibition</i>	214
<i>To Czechoslovakia</i>	207	<i>AEC Aids Export Research</i>	214
<i>Sulphuric Acid Figures</i>	207	<i>Polythene for Chemical Processes</i>	215
<i>Earnings "Nationalised"</i>	207	<i>Claims for a New Plastic Adhesive</i>	218
<i>Dispersed Ownership in Germany</i>	208	<i>Metals and Ceramics</i>	219
<i>Rumour and Propaganda</i>	208	<i>More German Reparations</i>	220
<i>A New Steel Record</i>	208	<i>German Plants Active</i>	220
<i>British "Home Grown" Streptomycin</i>	209	<i>Still More Silicones</i>	221
<i>Another Refinery for the N.E. Coast</i>	209	<i>Scottish Industry Reviewed</i>	222
<i>More Basic Chemicals Used in June</i>	210	<i>Nuclear Physicists to Serve U.S. Industries</i>	226
<i>Town Plan Abandoned</i>	210	<i>A Chemist's Bookshelf</i>	227
<i>Steel Works at Crewe</i>	210	<i>New Spectrographic Studies</i>	230
<i>Sulphuric Acid Production</i>	211	<i>Synthetic Resins</i>	230
<i>Defeating the Power Cuts</i>	212	<i>Non-Ferrous Metals in June</i>	230
<i>The European Fuel Problem</i>	212	<i>Industry and the Profits Tax</i>	234

than in the past. The Consumers' Council regards the provision of adequate supplies as important not only to prevent interference with industrial production but because it enables the consumer to choose the quality of coal which will suit his appliance. The supply of coal of the right size and ash content for any particular purpose enables that coal to be used with greater efficiency and increases the output of the plant. One means of economising in the use of coal is therefore to supply coal suitable to the consumer's purpose. The council points out that "high ash coal can be used efficiently if the quality and consistency can be assured over a reasonable period." It may be better to adapt or instal plant designed to consume high-ash coal, for some purposes, than to clean such coal.

This introduces the question of quality, a matter second only to quantity, and, as we have indicated, having a bearing on the work that can be done by a given weight of the stuff that is paid for as coal. An important pointer for those who are proposing to instal new coal burning plant is that, with the increasing use of machines in the mines there is likely to be a higher proportion of the smaller sizes in future coal output.

The Report of the NCB indicated that 45 new coal preparation plants with a capacity of about 14 million tons of coal

a year are operating, under construction, or ordered from manufacturers, and that a further 140 new coal preparation schemes are under consideration to deal with about 60 million tons of raw coal annually. It would seem that the ash content of coal is being tackled seriously and comprehensively by the NCB and that a considerable improvement should result in the course of the next two or three years. Meanwhile, all industrialists will subscribe heartily to the conclusions of the Industrial Coal Consumers Council that: "We cannot over-emphasise the importance as a long-term policy, of supplying each consumer with those grades and qualities of fuel which can be used with maximum efficiency in the particular plant." The provision of cleaner coal is an effective means of increasing the capacity of existing plant, but low-ash coal is not necessarily required by all users and may be unwelcome where coal is burnt on grates. The final conclusion of the council is that "in many directions, and especially from the long-term aspect, there is a limit beyond which the cleaning of coal may be so expensive as to justify the provision of consumer's plants for the use of low grade fuel. It is important that this should be borne in mind and that consumers should be given the earliest possible guidance as to the types of coal that will be available in future, so that they can plan accordingly."

NOTES AND COMMENTS

To Czechoslovakia

WHAT fate befalls the chemical industries of a country which adopts most of the harsh tenets of Moscow continues to be one of those subjects about which the official information services are uniformly uninformative. Few countries have undergone such profound political and economic changes as have occurred in Czechoslovakia since a goodwill mission from its chemical industry visited this country in March last year. The Association of British Chemical Manufacturers, which received the Czech chemical manufacturers on that occasion, now has the opportunity of seeing a little of what goes on "behind the curtain," having accepted a cordial invitation sent on behalf of the Czechoslovakian chemical industry to pay a return visit. The mission will leave here by air on September 17, fortified with the blessings of the Foreign Office and the Board of Trade and, more practically, by the presence of Dr. George Lewi as their liaison officer. Whatever the political climate may be, they will probably find in Czechoslovakia some of the more important factors influencing the future of chemical affairs on the Continent. The production there last year of more than 190,000 tons of sulphuric acid, over 470,000 tons of phosphatic and nitrogenous fertilisers and some 24,000 tons of dyestuffs testifies that the chemical activities, 92 per cent of which are now said to be State undertakings, are not mere exercises in political theory. A more typical indication of this widening activity was the notification last week from Prague of the reduction or elimination of import duties until the end of the year on a long list of chemicals, almost entirely of the basic kind.

Sulphuric Acid Figures

PRODUCTION of sulphuric acid and oleum in the three months ended June 30—398,744 tons—represented a reduction of 5251 tons on the total recorded in the first quarter of the year. That is one of the facts disclosed by the summary of manufacture and uses of the material upon which so wide a range of chemical and other industries depend, issued by the National Sulphuric Acid Association. This

is one of those collections of statistics in which wide fluctuations are usually indicative of instability in some of the most essential industries and the relative uneventfulness of the present record, apart from the not very significant reduction in the quantities of acid produced and used, is welcome. The reduced output is shown to have occurred in the chamber produced acid, which was some 6000 tons less, and this was partly offset by a small rise in the output from the contact process. Among the larger users a small falling off, in proportion to the large quantities represented, is shown to have taken place in the fertilisers industry, sulphate of ammonia and superphosphates, whose requirements, however, are more immediately a reflection of seasonal influences than of industrial affairs. Proportionately a larger change was the reduction by over 3000 tons of the amount of acid taken up by the rayon and transparent paper industries.

Earnings "Nationalised"

ONCE again in recent weeks the cry has gone up that the chemical and engineering industries must become State enterprises. The proponents are among those taking part in the Labour Party conference and the project is supposed to be high in the programme which some sections are urging upon the Government. Such projects must appear highly unrealistic to any who have consistently noted the evidence which one annual company report after another has presented of the contribution made by all the heavy industries to the national exchequer. In that respect these undertakings have been "nationalised" for some years, with the important distinction that, unlike the activities controlled by Government boards, they still yield a huge harvest to the Chancellor of the Exchequer. The trading results of Babcock & Wilcox, Ltd., recently discussed by the chairman, Lieut.-Col. Sir John Greenly, are typical of many in revealing how disproportionately large a share of profits are transferred to public funds: out of a total available balance of £960,755 resulting in 1947 more than 50 per cent—£499,741—was paid in taxation. Stockholders will get what is left, some

£363,000. The Babcock & Wilcox board, like most others, has "limited" dividend distribution. The remarkable thing is that by much enterprise and hard work it is still possible to set aside any adequate sum after satisfying the huge demands for taxation and plant maintenance, of which the latter required in the last two years £1.3 million.

Dispersed Ownership in Germany

THE complete change of outlook on what should be done with German chemical industry, since a four-Power commission in 1946 undertook responsibilities resembling those of a demolition party, is mirrored in the announcement last week that plans have been completed for transferring to German authorities the administration of all the I. G. Farben assets in the Anglo-U.S. zone. Soon a German panel will undertake the task of putting into effect the British and American intention that this overwhelmingly large proportion of German chemical industry should continue to operate under "dispersed ownership." The French authorities have been invited to take equivalent action in anticipation of the ultimate merger of the three zones. It is interesting to note that the final rejection of the unrealistic doctrine held earlier, aimed at the almost total destruction of Germany's chemical potential, implements some of the recommendations made long ago by representative chemical manufacturers in this country, who might excusably have supported the opposite view—that such powerful commercial adversaries of the past should be permanently eliminated.

Rumour and Propaganda

BUT for the distrust between nations which has been one of the legacies of war, and the consequent perpetuation of the secrecy which has barred the interchange of so much essential information, the facts about the I. G. Farben disaster at Ludwigshaven would now be widely known. That is obviously desirable, not merely to end speculation, but to ensure that any profitable lesson which that tragic event has to convey to others should be made widely known while the need to safeguard against a repetition elsewhere is keenly recognised. The prospect of any full and

frank revelation of the circumstances in which at least 178 are known to have lost their lives seems now almost as ephemeral as the hope of free discussion of nuclear fission. Even the number of lives lost, since the first greatly exaggerated reports, has for long been uncertain, and the extent of the physical damage, which the German radio says may have amounted to £3.75 million, is still apparently a security matter. These things perhaps are of less immediate importance than the identification of the circumstances and materials by which such an inferno was created, and about this any willingness on the part of the French authorities has been discouraged by the hostile propaganda the Soviet authorities have hastened to concoct round the alleged reports of survivors that the French were developing fuel for jet-propelled rockets. While the French have denied this and invited Russian pressmen to investigate, the whole tragic affair seems now to have been removed to a plane where the claims of scientific safeguards and human preservation are not heard.

A NEW STEEL RECORD

ANNOUNCING the July steel output, the British Iron and Steel Federation stated this week that the present annual rate of production is 14,723,000 tons, which is well above the recently increased 1948 target rate of 14,500,000 tons.

Although July is the industry's heaviest holiday month, the weekly average of 294,700 tons reached during this period, while less than the previous month, compares favourably with the weekly average of 211,700 tons in 1947.

For the second quarter of 1948 the weekly average production figures were 294,700 tons and the annual rate 15,323,000 tons, compared with the 1947 second quarter figures of 244,100 and 12,694,000.

Pig iron production in July was at an annual rate of 8,908,000 tons, compared with 7,460,000 tons a year ago. Figures for the second quarter were: 1948, weekly average 182,000 tons; annual rate 9,464,000 tons; 1947, 141,600 tons and 7,362,000 tons.

The July issue of the federation's monthly bulletin discloses that the heavy drain on stocks of pig iron and scrap has now ended and, in the second quarter of 1948, stocks were increased.

Another Refinery for the N.E. Coast

Reported Use of State Compensation Payment

PLANs for the establishment of a £3 million oil refinery in the Newcastle area were outlined last week by the Mayor of Halifax (Alderman C. Holdsworth) and his son, Mr. Donald Holdsworth.

The Mayor, and his business partner, Mr. Robert Hanson, have just received £2,277,833 from the Ministry of Transport as part payment for their shares in the Holdsworth-Hanson group of transport industries, now transferred to State control.

"The money is going to be put to good use," said Alderman Holdsworth. "Plans have been passed for the building of an oil-refinery on the North-East Coast with

full Government backing. It will take two or three years to build, and we may go to the public for a flotation."

Mr. Donald Holdsworth said that a start had already been made on the project but completion would depend upon the availability of steel supplies.

Early last June a 46-acre site at Low Flatworth Farm, near Northumberland Dock, North Shields, was reported to have been selected by an oil development company for its oil refinery scheme. The plant, it was then stated, would be the first of its kind to be established on Tyneside, and would eventually employ 300.

BRITISH "HOME GROWN" STREPTOMYCIN

THE first visible evidence of the successful completion of a project which was conceived in 1944, when Dr. Waksman revealed his findings on the production and potentialities of streptomycin, is contained in the pictures reproduced here. They were taken recently at Glaxo Laboratories, Ltd., Greenford, Middlesex. They reflect the new commercial production and distribution in this country of streptomycin—the first pictures of their kind—and illustrate inci-

dentally the exacting level of clinical safeguards involved in the proper handling at all stages of such antibiotics. Their production was based on prolonged experimental work with pilot plant at the company's establishment at Barnard Castle, Co. Durham, where latterly the deep fermentation process on a large scale has been in progress. This production, it is anticipated, will be greatly increased when the new Glaxo plant at Ulverston, Lancs., is put into operation.



Left, above: Workers at Greenford, filling streptomycin vials under highly aseptic conditions; all wear surgical gloves, face shields and are swathed in sterile gowns. Right: The rubber "valves" to the filling cabinets safeguard against the risk of air-borne contamination

More Basic Chemicals Used in June

Small Reduction in Non-Ferrous Metals and Rubber

A SMALL reduction in employment in the principal chemical and related industries is recorded as having taken place in May in the *Monthly Digest of Statistics* No. 31, July) of the Central Statistical Office. Workers in chemicals, explosives, coke oven and by-product works numbered 242,100 in May, approximately 1000 fewer than in the previous month.

The recent steady increase in the number occupied in the production of oils, paints,

varnishes, etc., was maintained, bringing the total to 80,600.

The probability that the fewer numbers employed may have been rendered possible by more economical use of manpower is supported by the record of generally increased use in June of most basic chemicals, as compared with June, 1947. The opposite tendency is exhibited by the figures for non-ferrous metals, as a whole, and waste and natural rubber.

The principal categories are as follows:—

	May, 1948			May, 1947		
	Production	Consumption	Stocks	Production	Consumption	Stocks
<i>Thousand Tons</i>						
Sulphuric acid	127.4†	125	58.2†	110.0†	111.0†	66.8†
Sulphur	—	21.7†	86.8†	—	18.8†	88.4†
Pyrites	—	18.3†	71.0†	—	14.8†	84.0†
Spent oxide	—	15.4†	166.7†	—	14.0†	149.7†
Molasses	11.3	24.9*	198.4	8.7	27.5*	118.5
Industrial alcohol (mil. bulk gal) ...	1.65	2.28	6.46	1.77	2.25	4.84
Superphosphate	92.7	77.1	54.4	87.9	94.8	100.8
Compound fertilisers	100.1	80.0	51.4	118.5	158.8	43.1
Agricultural lime	—	450.8	—	—	203.5	—
Ammonia†	—	6.86†	5.24	—	5.26†	4.20
Phosphate rock (agricult.)	—	72.0	158.0	—	65.8	180.9
Phosphate rock (indus.)	—	7.67	36.2	—	4.15	38.2
Virgin aluminium	2.51	12.1	—	2.54	13.1	—
Magnesium	0.18	0.19	—	0.26	0.50	—
Virgin copper	—	28.9	90.1	—	32.9	90.8
Virgin zinc	—	17.9	47.6	—	19.6	33.2
Refined lead	—	15.9	31.3	—	15.3	12.8
Tin	—	2.15	18.2	—	2.70	15.0
Zinc concentrates	—	14.9	63.0	—	14.2	75.0
Steel ingots and castings (incl. alloys)†	297†	—	—	254	—	—
Rubber						
Waste collected	—	0.02	11.1	0.07	1.87	74.1
Reclaimed	0.54	0.49	3.89	0.46	0.46	4.95
Natural	—	4.22	137.9	—	8.05	132.8
Synthetic	—	0.05	2.02	—	0.06	3.04

* Distilling only

† June

‡ Weekly average

TOWN PLAN ABANDONED

OWING to the possibility of subsidence being caused by salt deposits, Mr. Lewis Silkin, Minister of Town and Country Planning, has abandoned his intention to establish a new satellite town for Manchester at Mobberley, Cheshire.

Several weeks ago, Geological Survey engineers stated that three borings had revealed substantial salt beds at depths from 600-700 ft. (*THE CHEMICAL AGE*, July 3). In one instance, the lower extremity of the deposit had not been reached at 675 ft. and was believed to go far deeper.

It is reported that in his search for alternative areas, Mr. Silkin has been impressed with the possibility of development at Congleton, Cheshire. Another possible site is in the Crowton area. Almost the whole of this region may contain useful minerals.

STEEL WORKS AT CREWE

A CONSIDERABLE addition to overall steel production and to Crewe's industries is foreshadowed by the very large steel-producing installation to be set up on a 73-acre site in Weston Lane. The work of excavating is now being carried out for the British Toolmakers' Corporation, which has works in Wolverhampton, West Bromwich and other Midland towns. The work of levelling the site and laying foundations for the erection of a machine shop and foundry was started four months ago. Several months more will be required to complete the site in readiness for the erection of the works. It was stated authoritatively last week that, partly because of the difficulty in obtaining constructional materials, the plant could not be ready for production in less than two years.

SULPHURIC ACID PRODUCTION

A Small Reduction in April-June

NO very pronounced changes in the production of sulphuric acid and oleum and the amount taken up by industry in the three months ended June 30, 1948, are revealed in the classified summary which the National Sulphuric Acid Association has just issued. The total amount of acid produced during the quarter, 398,744 tons, compares with 403,995 tons in the January-March period, and the reduction is shown to have been confined to chamber-produced acid.

The reduction in the quantity used in the acid producing plants is insignificant and the quantity delivered to industry at large, 277,552 tons, is slightly less than 1000 tons below the figure recorded in the previous quarter. Rather less acid is shown to have been used in fertiliser production and for rayon and transparent paper and there was an increase of approximately 4 per cent in the amount used for dyestuffs and intermediates.

The association's survey supplies the following classified information:—

SULPHURIC ACID AND OLEUM Tons of 100% H ₂ SO ₄			
	Chamber only	Contact only	Chamber and Contact
Stock April 1, 1948	33,415	23,863	62,278
Production	192,971	205,773	398,744
Receipts	41,994	30,355	72,349
Oleum feed	—	3,679	3,679
Adjustments	-128	-54	-182
Use	123,057	76,677	199,734
Despatches	112,744	164,808	277,552
Stock June 30, 1948	32,451	27,131	59,582
Total capacity represented	220,120	216,510	436,630
Percentage production	87.7%	95.0%	91.3%

RAW MATERIALS Tons				
	Pyrites*	Spent Oxide	Sulphur and H ₂ S	Zinc Concen- trates
Stock April 1, 1948	69,115	166,494	76,090	23,344
Receipts	89,814	54,088	69,679	42,085
Adjustments	-95	-392	-411	—
Use	87,170	48,380	64,552	40,549
Despatches	92	4,399	50	10
	21†	265†	16†	—
Stock June 30, 1948	71,551	167,146	80,740	24,870

* "Receipts" and "Use" include Anhydrite "converted" to Pyrites.

† Used at works for purposes other than Sulphuric Acid Manufacture.

CONSUMPTION OF SULPHURIC ACID AND OLEUM (United Kingdom and Eire)

April 1st. 1948 to June 30th. 1948

TRADES	Tons 100% H ₂ SO ₄
Accumulators	2,258
Agricultural purposes	942
Bichromate and chromic acid	2,574
Borax and boric acid ("Unclassified")	—
Bromine	3,441
Chlorosulphonic acid ("Unclassified")	—

Clays (Fuller's earth etc.)	2,056
Copper pickling	756
Dealers	4,806
Drugs and fine chemicals	2,595
Dyestuffs and intermediates	20,137
Explosives	3,081
Export	916
Formic acid ("Unclassified")	—
Glue, gelatine and size	205
Hydrochloric acid	15,716
Hydrofluoric acid	1,848
Iron pickling (incl. tin plate)	21,727
Leather	1,826
Metal extraction	410
Oil (mineral) refining	10,547
Oil (vegetable) refining	1,827
Oxalic, tartaric and citric acid	1,977
Faint and lithopone	18,048
Paper, etc.	919
Phosphates (Industrial)	1,145
Plastics, not otherwise classified	3,197
Rare earths	575
Rayon and transparent paper	36,162
Sewage	2,805
Soap and glycerine	1,137
Sugar refining	167
Sulphate of alumina ("Unclassified")	—
Sulphate of ammonia	61,964
Sulphate of barium	1,255
Sulphate of copper	4,065
Sulphate of magnesium	2,054
Sulphate of zinc	672
Superphosphates	132,841
Tar and benzol	4,404
Textiles	5,903
Unclassified—Uses known	19,586
Unclassified—Uses unknown	10,720
Total	406,879

SCOTTISH DIATOMITE

SOME further details have been given of the plans for the development of diatomite deposits in the island of Skye by Scottish Diatomite, Ltd., a company newly formed for this purpose. An output of 2000 tons is expected in the first full working year, to be raised to about 5000 tons a year when the project is in full operation. The deposits were worked in the period before the first world war but have been lying fallow since.

It is estimated that there are at least 250,000 tons in the site at Loch Cuithir, 12 miles from Portree. A three-mile road to the deposits is now being constructed and some production is expected this year. Among the principal uses of the mineral are insulation and filtration. The Skye product is said to be of very high quality and compares favourably with raw materials now being imported from the U.S.A. Imported diatomite is currently being sold at rates ranging from £15 to £50 per ton, according to quality, and those values would offer prospects of successful development of a Scottish industry.

Defeating the Power Cuts

Advantages of Diesel Generators

MINISTRY of Labour plans for spreading the electricity load next winter (THE CHEMICAL AGE, July 17), provide for a peak demand reduction of 20 per cent by industry in the months of December, January and February.

This load-spreading cannot in itself, however, offset a generating plant deficiency which it is estimated, will reach 824 megawatts during the winter of 1951-52 despite the erection of new power stations in the intervening period. It is, therefore, difficult to see how the demand for increased production in industry, with a consequent rise in electric power demand, can even be attempted without further recourse to the "staggered hours" system introduced last winter.

Continuous Supply

These are topics of some urgency to which attention has been directed by Davey, Paxman & Co., Ltd., the diesel engine specialists, of Colchester. The company observes that many industrial concerns are now installing diesel-driven generating sets for the supply of electric power to their plants, thus ensuring continuity of production and avoiding the imposition of "irregular" hours upon their employees.

A diesel generating set, comprising diesel engine and alternator, occupying only 75 sq. ft. of floor space, will give an output of approximately 250 kW although it must be appreciated that this space covers only the driving and driven machine and not ancillary equipment such as fuel and cooling tanks. The engine possesses the additional advantage of running on an easily stored and non-inflammable heavy fuel oil, and although the question of the supply of this type of oil has been the subject of conjecture during the past few months, an assurance was given that there will be no shortage for diesel engines installed for the purpose of alleviating the power shortage.

Installation of the plant does not present much difficulty as many of the power units now supplied are self-contained and the engine and electrical equipment are mounted on a fabricated steel underbed, equipped with foundation bolts which need only be grouted down into concrete flooring.

Although it is only possible to give a general estimate of running costs, says Davey & Paxman, reports from various users assess these at 2d. to 1½d. per unit for plants ranging from 50 to 250 kW capacity. An accountancy depreciation period of 15 years is considered usual in the case of a well maintained engine of modern design.

The European Fuel Problem

Reluctant Use of Low-Grade Coal

From Our Italian Correspondent

ONE of the most pronounced examples of the widespread European problem of reducing the dependence upon imported fuel supplies by greater use of low-grade indigenous coal is at present receiving anxious attention in Italy. The country has relatively large quantities of home-produced coal, which many industries are reluctant to use. In June some 81,000 tons of Sulcis coal were produced and there was already a reserve of 140,000 tons.

Meanwhile, supplies of imported coal, chiefly American, are again on a large scale, and there is a prospect that obligatory purchases of Italian lignite and price cuts will be resorted to in order to compete with the imported supplies.

Preoccupied with the unwillingness of Italian consumers to use brown coal, numerous technicians in the country are suggesting its use by the Portland cement industry, which is supposed to be able to work satisfactorily with very low-grade fuels.

In reality this is not a fact. Before the war, Portland cement factories did use the local coal but it was chiefly the variety found in the mines of Arsa in Istria. This coal does not possess a great heating power (6500 calories) but it was convenient enough owing to its low ash content.

High Ash Content

Istria is now lost to Italy and thus the cement industry has at its disposal only Sulcis coal and some lignites. The ash content of Sulcis coal is in the neighbourhood of 20 per cent, composed principally of iron oxide, sulphur and lime. It has about four times the ash content of foreign coal. During the heat treatment of cement, at least a part of the ash is mixed with the clinker and when the ash content of coal is high the quality of cement suffers.

The cement factory at Spoleto, which uses lignites, secures a special variety not often available, and subjects it to preliminary treatment. It has also to use 20 per cent of imported coal.

Much has been written about the factory at Sinigaglia which was said to use entirely the home variety of coal. The fact is, however, that in spite of all their efforts and complex corrective processes, the technicians of this factory never succeeded in dispensing with imported coal altogether. On the other hand, the corrective processes led to prohibitive manufacturing costs, while the quality of cement produced barely reached the admissible minimum.

Untapped Oil Reserves

Exploiting Colorado's Vast Shale Beds

PPRIVATE oil companies are co-operating with the U.S. Government in exploratory drilling and assay work connected with the development of western Colorado's immense oil-shale beds, estimated to contain 300 billion barrels of shale oil, which, if recoverable, would represent the equivalent of 150 years' supply of liquid fuel, based upon the 1947 rate of consumption.

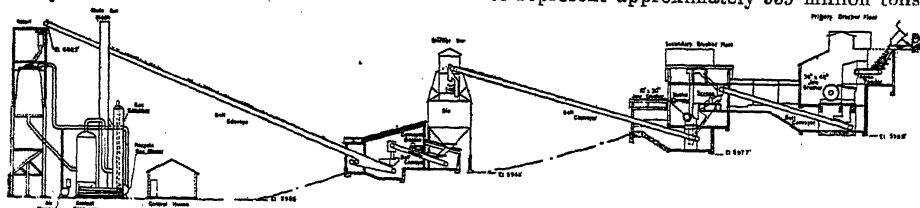
Extensive Drilling

At least 11 diamond core drill holes are to be sunk this summer in the Green River formation, which is said to be the world's largest single mineral deposit. At least four drillings are planned by the Union Oil Company of California, and seven by the U.S. Bureau of Mines, acting for the Department of the Navy. In addition, the Pacific Oil Company, a subsidiary of the Standard Oil Company of California, is carrying on geological and assay work to assess the value of its properties in adjacent areas.

Probing 1500 ft.

All Government-sponsored drilling will be done under contract on Naval Oil Shale Reserve No. 1, where the Bureau of Mines is now operating a shale-oil demonstration plant and an experimental mine under its synthetic liquid fuels research and development programme. Each of the seven holes tentatively planned by the Bureau of Mines will be drilled to a depth of 1500 ft., and these shafts, together with four others put down in 1945 and 1946 preparatory to the opening of the Bureau's mines, are expected to give the Navy more information on the extent of the deposits.

Drilling operations carried out by private oil companies will be conducted on their own sites. The firms plan to set up their own testing facilities and the Bureau has promised its assistance in training laboratory staffs and in periodically checking their analyses.



All the processes for the recovery of shale oil are represented in this flow sheet of the demonstration plant at Rifle, Colorado, where the U.S. Govt. and industry will collaborate. Shown (from right to left) are the primary and secondary crushers, (centre) the storage bins and conveyors, (left) the retort, contact condenser and gas scrubber

Wider Use of Lignite

Objectives of New U.S. Laboratory

SUBSTANTIAL advances in the technology of lignite, as a fuel and as a chemical raw material, are expected to result from the large-scale research laboratory for the U.S. Bureau of Mines, construction of which, at Grand Forks, North Dakota, is about to begin.

Representing the culmination of many years of co-operative research in lignite between the Bureau of Mines and the University of North Dakota, the new centre, in the heart of the American lignite country, will include a laboratory for small-scale research, a general service section for supplies, and a machinery bay suitable for large-scale pilot plant research.

One-fifth of All Reserves

Because lignite is a high-moisture coal which tends to crumble upon exposure to air, its present use is restricted primarily to the mining areas. To help expand the geographic distribution of a fuel which represents nearly one-fifth of the American coal reserves, the new research centre will concentrate upon improved methods of drying lignite. Development of effective drying methods should permit the transportation of lignite to more distant areas and will reduce the demand for higher-grade fuels. Bureau research will also be directed toward developing equipment for burning lignitic fuels and more efficient coal-gasification methods.

Chemical By-Products

Other phases of the research programme will include study of gasifying lignite to provide high-hydrogen gas and the development of new scientific, chemical and technical uses for lignite and its products.

American lignite reserves are estimated to represent approximately 939 million tons.

Copenhagen Exhibition

Sparse Chemical Publicity

COMPARATIVELY little individual effort to provide advance information here appears to have been undertaken, as yet, by the British chemical firms whose products will be on display at the 1948 British Exhibition opening in Copenhagen next month.

As far as the general organisation of this "Scandinavian shop window" is concerned, however, arrangements are well in hand and the demand for stand space has been so great that many applications have been refused.

The display (September 18-October 3) will be housed in Copenhagen's principal exhibition buildings, the Forum and the Tivoli Gardens and other premises which will be utilised include the Royal Riding House, the Gutenberghus and two floors of the Magasin du Nord, Denmark's largest department store. Several temporary buildings are also being erected.

Chemical Equipment

In addition to those members of the ABCM already announced (THE CHEMICAL AGE, June 5), exhibitors from industries closely connected with the chemical trade include the following.

Dexine Rubber & Ebonite, Ltd., Rochdale (moulded ebonite centrifugal chemical pumps, steam valve discs and moulded rubber lids for food storage equipment).

George Kent, Ltd., Luton (flow meters and instruments for measurement and control, including an air-operated apparatus for the automatic control of temperature, flow, pH pressure, etc., which is being shown for the first time outside Britain).

N. C. Joseph, Ltd., Stratford-on-Avon (aluminium drums for chemicals, and edible oils, etc., up to 300 litres capacity. This is the first occasion upon which bulk containers in aluminium have been exhibited on the Continent).

Stanton Ironworks, Nottingham (a range of spun iron pipes, including the new 650 mm. size which is the largest type of pipe spun in metal moulds in Britain and displayed for the first time in any overseas exhibition).

Bakelite, Ltd., London (new type of decorative laminated plastic sheet material which, though possessing rigidity can be formed to suit various purposes and at the same time passes the British Standards test for non-inflammability).

Rheostatic Company, Ltd., Slough (automatic temperature control devices, including a new mixing valve which permits domestic

(Continued at foot of next column)

AEC Aids U.K. Research

First Export of Equipment

TWO high-voltage X-ray generators, to be used in research, will be sent to the United Kingdom under export licence from the U.S. Atomic Energy Commission, the commission has announced. The licences are the first granted by the commission for export of such equipment since it issued a regulation last November for control of facilities that can produce fissionable materials.

"Although some types of particle accelerators can produce microscopic amounts of fissionable materials," the commission said, "such machines are primarily research tools." It added that the type being sent to the United Kingdom was used mostly in medical and biological research.

The National Physical Laboratory, Teddington, will get one of the generators and the Sheffield National Centre for Radiotherapy, Sheffield, the other. The Teddington laboratory plans to use the machine for X-ray standardisation of dosage and protective levels. The generator going to Sheffield will be used in research on radiotherapeutic techniques and cancer studies.

Peat Fertiliser

Encouraging results are reported in Scotland from the use of a compost based on peat and incorporating all the vital plant food elements. One instance, confirmed by the Shawfield Park, in Glasgow, reports exceptionally fast and excellent results where the compost was used to return sections of the field which had worn bare. Cost is likely to be the only limiting factor, since incorporation of all the essential elements in the compost makes it fairly highly priced.

water temperature and boiler temperature to be maintained at constant high value while heating the flow water.

Advance details of the I.C.I.'s stand indicate that the firm's main object is to convey a brief impression of the company's world-wide scope and resources.

Exhibits will be arranged to illustrate the importance of coal in the organic chemical industry and after outlining the company's organisation, will publicise some of its 12,000 different products, which range from heavy chemicals, fertilisers, explosives, dye-stuffs, paints and non-ferrous metals to medicinal drugs, zipp fasteners, sporting ammunition and leathercloth.

In the mornings, the exhibition will be open only to trade buyers and official visitors. The public will be admitted after lunch and on Sundays.

POLYTHENE FOR CHEMICAL PROCESSES

Many Uses of a Versatile Material

From a Special Correspondent

AT normal temperatures polythene is practically immune to the action of most corrosive chemicals and solvents. In addition to general inertness to attack, this thermoplastic material can be shaped, welded or moulded to make pieces of chemical plant and sheets of polythene may also be used for the lining of vats made of wood or metal. Other important advantages enjoyed by polythene include a low density (0.92 at 20°C.), flexibility and a high degree of toughness.

Polythene is available in several different grades depending on the molecular weight and therefore the fluidity or viscosity of the molten products. The shorter molecular chain compounds are mobile oils which find special uses in industry while the products whose molecules have a mean length of about 600 ethylene units are translucent, tough, flexible wax-like solids, the tougher grades of polythene, i.e., those lying in the molecular weight range of 13 thousand to 25 thousand, are of most interest to the chemical engineer as they possess superior mechanical properties and greater resistance to solvents and chemicals and water than the lower molecular weight grades.

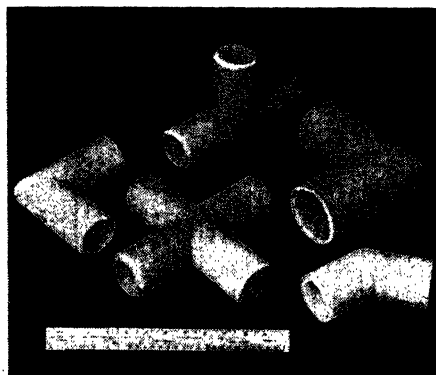
This plastic possesses a very high resistance to moisture penetration. Good polythene mouldings show no gain in weight after seven days' immersion in water at all temperatures up to 100°C. Water absorption becomes detectable only if moulding is carried out at too low a temperature and under these unfavourable conditions the polythene article is likely to show a gain in weight of 0.025 per cent after seven days' immersion in water.

Immersion Factors

At normal temperatures (20°C.) the solid grades of polythene are insoluble in all solvents, although some absorption occurs. When the temperature is raised to about 60-70°C. polythene becomes readily soluble in certain solvents, including benzene, xylene, toluene, trichlorethylene, carbon tetrachloride, chlorobenzene, petroleum ether (b.p. 80-120°C.), tetrahydronaphthalene, "medicinal paraffin" and mineral lubricating oils.

At temperatures below 65°C. polythene is practically unaffected by chemicals. When immersed for 24 hours at 100°C. in dilute nitric and concentrated hydrochloric acids, and in 50 per cent caustic soda, thin strips of polythene showed no change. Under

similar conditions concentrated sulphuric acid produced some charring. Organic low molecular weight polar liquids, e.g., alcohols, esters and ketones, are poor solvents but they may cause polythene to fracture under strain if in contact with the liquid or vapour. A sample immersed in the liquid



These are some of the variety of joints which are now being fabricated in polythene

or in contact with the vapour regains its flexibility when allowed to dry.

Several different forms of this plastic are available for use in chemical vessels and plant. The most readily adaptable is the granular form which is suitable for all flow-casting, moulding and extrusion methods. Among the many other forms in which the thermoplastic is now being met with are sheets, tubes, rods and film, and as a powder suitable for flame spraying. The sheets are chiefly of interest as lining for many forms of large chemical vessels.

The mechanical strength of polythene varies with different grades, the toughest grade giving the best results, although this is not so adaptable for some equipment-making applications. Generally, the tensile strength of a tough grade of polythene is from 1800-3000 lb. per sq. in. and the extension at break 150-600 per cent.

The thermal expansion of polythene amounts to 0.00020 cm./cm. 1°C. in the range 0-40°C. The thermal conductivity is 0.0007 cal. per sec. per cm. per cm.² per 1°C., equivalent to 340°C. per watt per cm. per cm. Below the melting point (115°C.)

polythene is remarkably free from cold flow. This is important as it ensures that when chemical plant is in use there is no fear of alteration of shape, provided the temperature is maintained at a figure well below the softening point.

The flexibility of polythene is lessened with decrease in temperature below $0^{\circ}\text{C}.$, the lower molecular weight grades becoming brittle at -25 to $-30^{\circ}\text{C}.$, while some of the tougher grades remain flexible at $-100^{\circ}\text{C}.$

Production of Polythene Chemical Plant

There are eight methods of using polythene for the total or partial production of chemical plant:—

1, Flow casting; 2, centrifugal flow casting; 3, sheet lining of metal and wood vessels; 4, extrusion of tubing; 5, extrusion moulding; 6, moulding (compression and injection methods); 7, welding; 8, flame spraying.

The first two processes take advantage of the properties of hot melts and are aptly suitable for the production of hollow articles and containers of large dimensions. A low melt-viscosity polythene is generally preferred for this type of work as it is easier to mould and shape than are the tougher grades.

The flow-casting method is fairly simple in principle and entails the use of sheet metal mould, made in sections which can be clipped together, and first treated with a lubricant. Polythene in granular form is placed in the mould which is heated to $160^{\circ}\text{C}.$ to melt the polythene. The mould is then inverted so that the sides are coated with a uniform layer of polythene. After cooling with cold water, the mould sections are unclipped and the casting may be stripped from the mould.

Centrifugal flow-casting is merely an elaboration of this method. The calculated amount of polythene granules is placed in the well lubricated brass mould which is heated to $200^{\circ}\text{C}.$ and then rotated until all the polythene has melted and flowed evenly over the surface. The mould is cooled while rotation is maintained and, after two hours, the moulded article is withdrawn.

Plant is lined with polythene sheet by the following method:—

1. The sheets are cut to fit and, if necessary, shaped or bent by first heating until softened and then bending over wood formers. The optimum temperature for manipulating the polythene for this use is $105^{\circ}\text{C}.$

2. Welding of the joints is carried out with a specially designed electrically or gas heated welding torch which makes use of a stream of nitrogen gas at $200^{\circ}\text{C}.$ When

this jet is directed on to the joint and a polythene filler-rod used to make the weld it is possible to effect perfect sealing.

3. Where parts of the equipment have to be machined there is no difficulty in working polythene block in ordinary wood cutting machines. It is advisable to direct a jet of air at the turning to prevent heat softening of the polythene and to remove swarf.

4. If tubes of large diameter have to be bent it is recommended that this should be carried out at about $105^{\circ}\text{C}.$ The use of bending springs prevents the premature collapse of tubes and maintains a uniform bore.

By simple fabricating methods it is possible to build up large containers for corrosive acids, pipes in 3-4 ft. diameters, T-pieces and flanged pipes for chemical works.

The extrusion of tubing of diameters up to about 10 in. presents few practical difficulties provided the correct temperatures are maintained for the grades employed. The tougher grades of polythene require a barrel temperature of about $115^{\circ}\text{C}.$ and a die temperature up to $160^{\circ}\text{C}.$ Tubing leaving the extruding die is generally cooled by passing through a tube which is air cooled and allows for the extruded tube itself to be supported internally by means of a stream of air. There is an inevitable expansion of polythene as it leaves the die and to compensate for this it is necessary to adjust the speed of drawing so that the correct bore and wall thickness are obtained.

Extrusion Mouldings

Extrusion moulding is a comparatively new method which makes use of light and inexpensive moulds and yet enables mouldings up to 100 lb. or more in weight to be produced.

In this method of moulding—forcing the melted polythene into a metal mould by means of a screw type of extruder—when the mould, which should be provided with air vents (sealed at the time of filling), is filled it is progressively cooled from the points furthest from the nozzle. If the mould is exceptionally large, great care needs to be taken to prevent premature cooling and it is usually recommended that the mould be maintained at a temperature of $85-125^{\circ}\text{C}.$, during the filling operation, and afterwards reduced slowly.

Moulding by either compression or injection methods will give good results, provided adequate allowance is made for high mould shrinkage due to the high coefficient of expansion. The heat applied during moulding has no harmful effect on the plastic and oxidation does not take place.

Flame spraying of polythene has been

used with some success and coatings have been applied to metal, wood and ceramic surfaces. The difficulty has always been to achieve a high degree of adhesion to the base and to build up satisfactory coatings on sharp edges and in recesses. The difference in thermal expansion between the coating and the base material also tends to mitigate against firm adhesion.

It has been found that the adhesion of polythene to metal is improved by first applying a layer of asbestos flock which may be made to adhere to the surface by means of special adhesives. This asbestos layer forms a very satisfactory key for the deposit of polythene and enables good thicknesses to be built up.

In flame spraying it is necessary to use a fine powder which is sprayed through a concentric flame of an ignited mixture of air and butane or boosted town gas. In practice, the cleaned and degreased metal article is first warmed and the applied polythene coat given a final "flaming" to ensure that the deposit of polythene has a fine, smooth surface.

Chemical Equipment

While standard fabricated forms of polythene find many uses in chemical works, the greatest use is found for the specially designed and made-to-measure pieces of equipment. These the chemical engineer requires for an increasing number of processes which involve the handling of corrosive liquids. Such things as metering wheels

for pumping systems in acid works have been successfully moulded of polythene and so also have many other items of specialised equipment.

Small bore extruded tubing and tubing up to 60 in. diameter produced by centrifugal casting processes give good results for conveying acid liquors and other corrosive fluids, provided these are not above 65-70°C. Flanged pipes, T-pieces are also more or less standard pieces of equipment. Polythene-lined steel pipes are important for works where there is need for chemical resistant piping having rigidity and pressure strength.

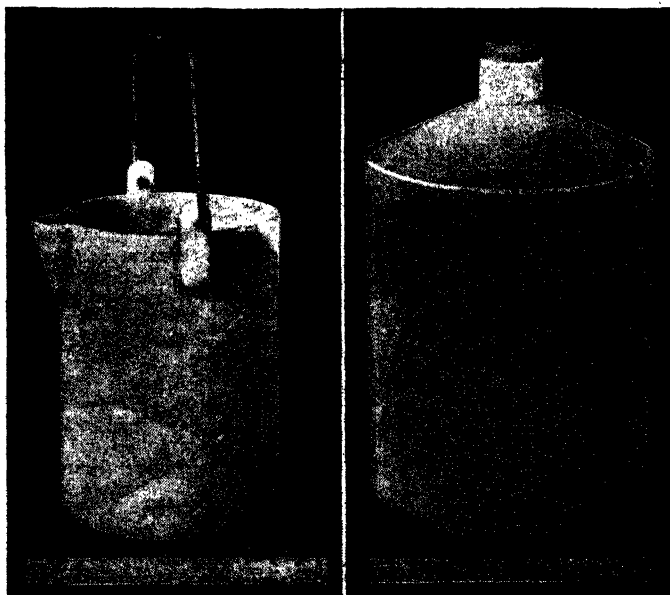
No Contamination

Apart from the use of polythene tubing for conveying acids, alkalis and salt solutions, etc., it is also proving of value for handling fine chemicals and biological preparations which must be free of all traces of metallic impurities. In the production of penicillin, streptomycin and other highly sensitive therapeutic agents the use of polythene tubing has a special usefulness as it offers the inertness of glass without its fragility, weight or rigidity; moreover, whereas glass and metal tubing cannot readily be bent at acute angles without risk of breaking, the polythene tube is readily amenable to all forms of bending.

Polythene carboy caps, gaskets and sealing rings are now fairly common. They are exceptionally tough and withstand pro-

For nearly every kind of corrosive liquid polythene is providing a highly adaptable material for the construction of containers, such as the stout bucket and well-designed carboy shown here

*Illustrations by courtesy of
Rockwell, Ltd., Croydon*



longed exposure and rough treatment without deterioration.

Comparative Merits

Of the three important thermoplastics used for the construction of chemical plant polythene seems to possess the most advantages. This may be ascribed to the fact that it combines toughness with resiliency and is less liable to fracture than hard and brittle materials. Saran (polyvinylidene chloride) has a higher softening point than polythene, the hardest grade being able to withstand temperatures up to 350° C., but because of its lower resiliency chemical plant made from it is liable to shatter when subjected to pressure or sudden shock. This weakness is particularly important where extruded tubing is used for conveying corrosive liquids. Rigid PVC possesses a somewhat higher impact value than Saran and although less resilient than polythene, is better able to withstand pressure and, therefore, less liable to damage.

Bearing in mind the limitations imposed by the thermoplastic nature of polythene, there is reason to anticipate an increased demand once the chemical industry widely appreciates the comparative simplicity of converting it into pieces of equipment.

In the writer's opinion the most promising

future for polythene in chemical plant lies in its use as a protective lining for metal. (So far the successful development of polythene-metal equipment has been fairly slow owing to the difficulty of securing good adhesion of the plastic to the metal). Emphasis is placed on the importance of manufacturing polythene-lined metal drums, tankers and storage vessels, which would supply a pressing need in chemical industry.

It is of interest to note that polythene film has been used to a small extent for the lining of wooden kegs to be used for the bulk packaging of dye intermediates and other solids of a highly corrosive nature. As the film can be heat-sealed there is no difficulty in ensuring good sealing of the lining.

Progress has been made in the development of polythene coated paper and fabric for packaging materials of a corrosive or hygroscopic nature. The polythene, which is applied to the paper or fabric as a hot melt by means of a doctor blade, keys perfectly to the material and provides a tough and corrosion-resistant surface. Once polythene is freely available, it is likely that extensive use will be made of coated paper sacks for the bulk packaging of a wide range of solid chemicals.

CLAIMS FOR NEW PLASTIC ADHESIVE.

A NEW adhesive for bonding polystyrene either to other pieces of the same material or to certain other solids has been developed by the chemical division of the Koppers Company, Inc., Pittsburgh, Pennsylvania. When bonds are made with the new adhesive, one joint element must be polystyrene while the other may be paper, cardboard, fabric, glass, rubber, or certain other plastics.

Designed to eliminate many of the shortcomings of previously obtainable adhesives for polystyrene, the following advantages are claimed by the company for the new adhesives:—

1. Although it is a polystyrene solvent, its solvent power is controllable so that etching, which weakens the plastic and mars its appearance, is minimised and moulding stresses in the polystyrene are relieved before they can cause cracks, the new adhesive having a relatively slow evaporation rate.

2. It has quick initial set. Assemblies may be carefully set down or removed from clamps in less than five minutes after the adhesive is applied. They can be packed within two hours. Permanent set with

maximum bond strength develops within a few days.

3. When the adhesive is properly applied, clear, bubble-free bonds of great strength are obtained.

4. In dry assembly it can be applied with a small brush, a hypodermic syringe, or an eye dropper, since it flows readily.

5. It can be used for filling the gap between poorly matched joint surfaces by mixing two parts of the adhesive with not more than one part of polystyrene. The mixture is then used as a cement.

The new adhesive was developed after many months of research.

Canadian Chemicals and Plastics

The British Columbia project of the Celanese Corporation of America is stated to be only the initial phase of what Celanese principals visualise as a fully integrated plastics and chemical industry on Canada's Pacific Coast.

Columbia Cellulose Co., Ltd., a wholly-owned subsidiary of Celanese Corporation of America, is expected to start production of pulp towards the end of 1950. Construction of a mill is now in progress.

METALS AND CERAMICS

Wide Industrial Possibilities of Coatings

THE combined use of metals and ceramics under conditions in which considerable stresses and thermal shock are to be anticipated was recently the subject of an unusually informative symposium provided by numbers of specialists in the U.S.A. The meetings, lasting two days, were convened by the headquarters of the U.S. Air Materiel Command and, while the data was immediately concerned with aerial jet-propulsion units, it threw useful light on many procedures designed to overcome the obstacles presented in high temperature work by the relative instability of most metals.

Brigadier-General Brentenaugh, Deputy Director of Research, welcoming the group, recalled the fact that only ceramic materials were able to withstand the high temperatures, 2000-5000° F., developed in aircraft engines.

The Air Materiel Command was interested in immediate applications, and had employed under contract the facilities of institutions which could operate in familiar areas, and with whom commercial firms could co-operate in further developments of the materials developed experimentally.

Colonel R. J. Minty, of the Power Plant Laboratory, stated that in reciprocating engines temperatures up to 3000° were encountered, and turbo-chargers operated continuously at even higher temperatures. Materials of construction to operate successfully under these conditions had been sought since 1940 when certain satisfactory alloys were produced. It was found, however, that the ultimate temperature which metals could withstand was about 1800° F., and for the higher temperatures ceramic materials were necessary.

Heat Resistance

The first formal paper was presented by Major R. A. Jones, of the Power Plant Laboratory, on "The Requirements for Ceramic Materials for Application to Aircraft Power Plants." He noted that power plants had to be smaller and operate on less fuel. Ceramic materials had been found to withstand satisfactorily higher temperatures than metals, and had sufficient strength. They were used for protection or replacement. Ceramic materials had the additional advantage of being non-strategic and in good supply.

Major Jones defined as a ceramic any non-metallic, non-heat-conducting substance. Among the physical and mechanical properties necessary for ceramic coatings for metals. Major Jones mentioned unfired and

fired, brushed or sprayed coatings, metal-bonded ceramics, and tin surface treatments. These materials had to be heat-and-shock resistant and prevent oxidation of the metal to which they might be applied. Such coatings increased the life expectancy and stability of the metal in service.

By virtue of their insulating and radiation-suppressive properties they could operate above the maximum temperatures ordinarily withstood by metals. Coatings of the thin type had advantages of adherence, thermal shock resistance, and the ability to withstand centrifugal force. These coatings have been found to have special emissive characteristics.

Choice of Materials

For turbine blade construction much research on composition and mechanical behaviour, especially mechanical shock resistance, was required. For this purpose the metal-bonded oxides, nitrides, and carbides were promising. For jet engines and ram-jets, insulative bodies of greater thickness were required, and these were sometimes used as preformed segments for liners. In jet engines, enamels were satisfactory from 1300° to 1600°, but the temperature at which these engines operated could be raised to 2500° if protective materials could be found.

Rocket engines operated at temperatures up to 5500° F. and required coatings with a softening point above 3500°. The temperature at which these engines could be operated was limited only by the refractoriness available.

A paper on metal-protective ceramic coatings was presented by Mr. W. J. Plankenhorn, University of Illinois, who reviewed the formulation of base and top coats in an endeavour to attain better insulating value and maximum protection of the underlying metal.

Fundamental factors such as the effect of coatings on the strength of metals at high temperatures had been investigated. Oxidation rates had been measured by weight increase. Tensile tests at high temperatures showed that the coated metal had greater strength than the uncoated. The materials developed in this investigation worked satisfactorily up to 1800° F.

Reviewing the work of the Ohio State University group on metal-bonded coatings ("cermets"), Mr. E. T. Montgomery said these materials became plastic only when they reached temperatures of the order of 2000° above the melting point of the metal.

In some cases the metal melted away, leaving the coating intact—a significant point in relation to rocket design.

The first "cermet" was made from cobalt and silicon carbide. Combinations of iron and magnesia, nickel and magnesia, cobalt and magnesia, iron and alumina, and aluminium and alumina, had been developed. The metal oxides appear to go into solid solution.

One of the best cermets consisted of 75 per cent nickel and 25 per cent magnesia. Some coatings were applied cold, using 25 per cent sodium silicate as a vehicle; in other cases flame spraying was used. Satisfactory results had been obtained from torching and furnace sintering of coatings applied cold. The metal coated on both sides with the Ni-MgO cermet at a thickness of 5 mm. had withstood 2800° F. for some time and 3500° for as long as 2 minutes. In one test 1020 steel so protected withstood 5000° F. for 15 seconds.

Development of enamel-type coatings and metal-bonded ceramic coatings was briefly reviewed by Mr. R. M. King, of Ohio State University, who said that enamels had been applied to inconel at 2300-2350° F. Quartz, flint, and feldspar have been used as mill additions. Efforts had been made to develop tests of such coatings, particularly with regard to thermal shock resistance.

A paper on "Cermet Solid Bodies," by Mr. T. S. Shevlin, Ohio State University, dealt with the theory of wetting and bonding. Ceramic bodies alone were not sufficient to withstand service conditions in jet-propelled engines, but the addition of metal powder increased the necessary resistance to thermal shock.

Work was begun by the introduction of chromium and aluminium into alumina bodies. A pink colour observed, was due principally to particle size, and only indirectly to chemical reactions. Solid solutions formed enhanced the refractoriness of the body. It was found that there was no inherent tendency for the metal to wet Al_2O_3 below 3000° F.; but wetting involved the formation of oxides at high temperature. High metal vapour pressure was likely to lead to poor strength.

In the discussion following these papers, Mr. R. E. Stark, Stupakoff Ceramic and Mfg. Co., brought up the question of toxicity of beryllium oxide, which, however, was not as high as that of beryllium metal and beryllium fluoride which sometimes gave rise to disease, and had been known to prove fatal. The point was made that although beryllium oxide itself was not very toxic, in operations involving its use, as in the preparation of metal-bonded bodies, extreme precautions were necessary.

MORE GERMAN REPARATIONS

SEVEN more German industrial plants, available as reparations and about to be allocated between the member nations of the Inter-Allied Reparation Agency, are listed in the current issue (August 7) of the *Board of Trade Journal*.

Among them are two chemical plants, Chemische Fabrik, V. Transche & Co., K. G. Gertshofen, producing hydrazine hydrate; Kalle & Co., Wiesbaden-Biebrich, part plant for the production of methyl, ethyl, and cellulose type products; two metallurgical plants, Heinrich Diehl, G.m.b.H., Nurnberg, producing aluminium and copper fabrications, and Degussa, Rheinfelden, part plant for the manufacture of beryllium.

The remaining three, comprising engineering and machine tool equipment, are O. and K. Giessler, Munchen, Huttenverein, A.G., Dortmund-Hoerde, N.-Rhein, Westf., and Heinrich Wagner.

Those wishing to acquire any of this material should communicate, before the end of August, with the production departments of the Board of Trade or the Ministry of Supply.

GERMAN PLANTS ACTIVE

THE Argentine Government has recently published a *communiqué* about the fate of the 30 odd former German concerns which have been put under special State administration by the establishment of the Dirección Nacional de Industrias del Estado.

Regarding former German chemical enterprises, it is stated that the Institut Behring-Beyer, the leading unit of its kind in Argentina, has increased its output by 20 per cent since the end of the war. It manufactures among others veterinary sera of importance to the cattle breeding districts. Among iron and steel producers, the former German enterprise "Crefin," has since the war erected a new rolling mill and a Siemens Martin furnace. Monthly output of rolled products totals 1500 to 2000 tons, that of foundry products 400 tons and steel production is said to total 2000 to 2500 tons. Only Argentine raw materials are being used by this concern. The machine construction plant of the Thyssen Lametal Company has been converted to serve the needs of the State Oilfields Administration.

STILL MORE SILICONES

Widening Applications in Many Industries

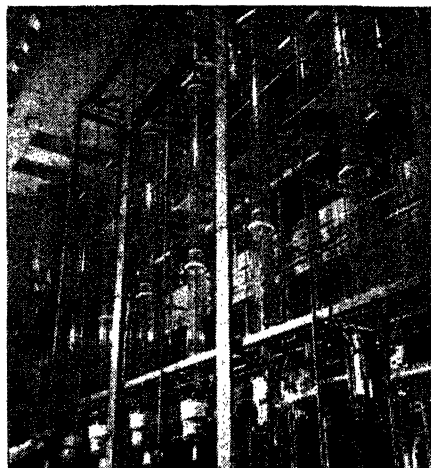
THE rapidly increasing importance of silicones as a branch of chemical industry and their application to many other industries is reflected by the recent completion at Waterford, New York, of what is probably the largest manufacturing plant for silicone products. It is being operated by the chemical department of the (U.S.) General Electric Company which, having operated on a smaller scale for nearly a year, is now undertaking full production, in the light of its recent experience of production and industrial needs.

According to the head of this department, the demand for silicone materials, principally in the forms of rubber, oils, greases, resins and water repellants, has come from nearly all branches of industry interested in heat-resistant materials. He considered that applications for the materials in all forms would become increasingly widespread.

Temperature Resisting Gaskets

Derived from sand and processed by a completely new form of chemistry, silicone materials can withstand a wide range of temperatures from approximately 70°F. below zero to 520° above. The materials are now being applied in as widely diversified products as diesel engines and fishermen's dry flies.

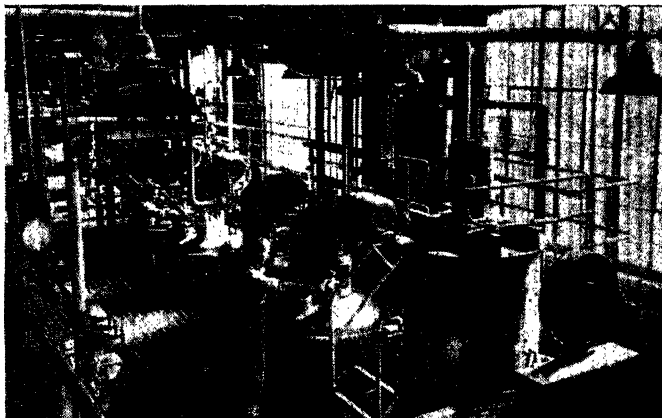
The major output of General Electric's silicones to-day is in the form of rubber, oils, and "bouncing putty," which has been successfully used as the centre of golf balls. The silicone rubber is being applied primarily as gaskets for a host of industrial products such as capacitors, jet and gas tur-



bine engines, baking ovens, lighting fixtures, and high vacuum systems. One of the principal uses for the oils is as a mould lubricant in the manufacture of automobile tyres and in aluminium and zinc die-casting.

A new material which reduces water absorption in concrete and cement products and forms an invisible water-repellant coating on walls, floors, and similar surfaces, is now being investigated by the company's chemical department. A derivative of silicone materials, the water-repellant is a new grade of the company's Dri-Film which has been successfully used for treating ceramics, paper, plastics, and other materials. It can be applied by spraying or brushing.

Series of reaction
kettles in the new
(U.S.) G.E.C. silicone
plant and (above)
some of the twelve
distillation columns
used for small-scale
laboratory work



SCOTTISH INDUSTRY REVIEWED

White Paper Reflects General Expansion in 1947

THE development of many new chemical substances, says the annual review of Industry and Employment in Scotland, 1947 (HMSO, 1s. 6d.), continued during the year, to a large extent as the result of putting wartime knowledge to useful peacetime purposes. Particular reference is made to the I.C.I. product—"Ardil." This fibre has proved so successful that plans have been made for its production in another I.C.I. factory in the south-west of Scotland. It

THE rigour with which Scottish industry and administration are putting into effect the policy of developing output of manufactured and natural products is reflected in the recently issued review of industry and development, summarised here, and by the appointment last week of a Mineral Resources Panel of the Scottish Council under the chairmanship of Mr. J. C. George, served by the following: Major the Hon. Robert Bruce; Mr. A. S. Butler, Department of Health for Scotland; Prof. W. M. Cumming, Royal Technical College, Glasgow; Mr. W. D. D. Fenton, North of Scotland Hydro-Electric Board; Prof. G. Hibberd, Royal Technical College, Glasgow; Dr. MacGregor, and Dr. T. H. Whitehead, Scottish Office, Geological Survey, and Mr. W. R. Flett (secretary).

is expected that this new venture will use a by-product of the African groundnut scheme. Utilisation for the paint industry of a material used in wartime as the basis of a powerful explosive and manufacture of fertilisers from wartime smoke-screen material are among other developments which have taken place in Government factories in Scotland.

Proposals by British Petroleum Chemicals, Ltd. (formed jointly by the Anglo-Iranian Oil Co., Ltd., and the Distillers Co., Ltd.), to erect an extensive factory at Grangemouth for the processing of chemicals from petroleum, asserts the review, will augment an already well-established industry in that area. The consumers of these chemical derivatives will include the plastics and rayon, drugs, pharmaceuticals, dyestuffs and textile printing industries.

Cooper, McDougall & Robertson, Ltd., Glasgow, has undertaken great extension schemes for its works. They will be carried out in stages over the next few years at an estimated cost of £1 million. The labour force has been increased by 30, while the total scheme will require a further 300-400 workers. It is further noted that 90 per cent of the firm's output is for export, principally to hard currency countries. Five new projects approved in the chemical industry during 1947 should give employment to about 500 persons when in full production.

Alginate Products

The Scottish Seaweed Research Association continued its activities during the year. Commercial developments in this industry are carried out by Alginate Industries, Ltd., which already has factories at Girvan, Barchaldine, Kames Bay and Lochboisdale. Intensive research and experiments in the potential industrial uses of seaweed have revealed diverse and increasing possibilities. From alginic acid and its salts are derived products of proved value in the manufacture of food, transparent films, paints, electrodes, textiles, plastics, and cosmetics. One of the newest products is a soluble alginic swab for medical purposes.

The rearrangement of the three factories producing maize starch in the Paisley area (mentioned in last year's review) had not yet been possible, but a slight increase in output had been achieved by means of an alteration in the methods of production without involving the employment of any extra labour.

Oils and Fats

Despite the great decrease in imports of oilseeds into the U.K. compared with the pre-war years, the Scottish mills are processing roughly the same tonnage. The industry is far from working to capacity and only five of the eight Scottish mills are in operation. An additional margarine factory was reopened in Aberdeen during 1947, making a total of six margarine factories and eight compound factories. The animal fat melting trade is still "concentrated," and production is restricted because of raw material shortages.

The British Aluminium Co.'s reduction plants at Foyers and Lochaber in Inverness-shire, and Kinlochleven in Argyllshire, produced 18 per cent of the year's consumption of virgin aluminium and 10 per cent of the

total consumption, including secondary and scrap metal. From 1600 to 1700 persons were employed at the reduction and hydro-electric works, but this number will probably fall to 1500 during 1948 because of the reduced load arising from the reconstruction and re-equipment programme, which was started in 1947. This will probably be completed about the end of 1948 and is expected to increase output by 17 per cent. Similar economies in employment are being made at Burntisland factory producing alumina from imported bauxite.

The Scottish rubber industry, like its counterpart in England, is operating at a rate considerably above any previous peacetime level.

During the past year plans for greatly increased tyre production did not wholly materialise. Owing to the fuel crisis many subsidiary raw materials such as fabrics, beadwire and chemicals became scarce. Channel grade carbon black was also in short supply. These shortages, however, were in the main, overcome during the year. Another large tyre-producing concern in Scotland, The India Tyre & Rubber Co., Inchinnan, has very big schemes in hand for extensions to be carried out over the next two years at an estimated cost of £100,000. Part of the scheme is proceeding, and it is estimated that employment for an additional 750-800 will eventually be available. The proportion of persons known to have been engaged on export work in the rubber industry at the end of the year was 35 per cent.

Shale Oil

The industry, which is centred in the Lothians, is an important source of liquid fuels and paraffin wax; ammonia fertilisers are also produced and bricks are made from the spent shale. In the past ten years the output of oil shale rose from about 1.6 million tons in 1938 to 1.78 million tons in 1942 and then declined to 1.24 million tons in 1947. The quantity of crude oil and naphtha produced from shale at the four retorting plants varied proportionately, and amounted to approximately 25.5 million gal. in 1947, which was nearly 14 million gal. less than the quantity produced in 1942.

The cause of the fall in oil shale production in recent years has been wastage of manpower, which was mainly due to the better conditions of employment in the coal mining industry. The number of underground workers in the shale industry dropped from 1846 in 1942 to 1468 at the end of 1947. To improve recruitment better conditions of labour and increases in wages were introduced in May, 1947, by agreement between the National Union of Shale Miners and Oil

Workers and Scottish Oils, Ltd., the company operating shale mines in Scotland.

Refining

In 1947 refining operations were carried on at Pumpherston, Grangemouth and Ardrossan. The Pumpherston refinery treats crude petroleum from the oil wells at Dalkeith and in Nottinghamshire and Lancashire, as well as crude oil and naphtha from shale, and the Grangemouth and Ardrossan refineries also treat imported petroleum oils. During the war years the total production of liquid products in Scotland declined to a low point of 32.9 million gal. in 1945, but has recovered rapidly in the past two years. In 1947 it amounted to 123.6 million gal. or only 5.4 million gal. less than in 1938 and was about 23 per cent of the total amount of liquid products refined in the U.K. in that year.

Production of solid products followed a similar course to that of liquid products, the lowest annual figure being 43,000 tons in 1943. In 1947 the output of solid products totalled 83,000 tons, consisting mainly of bitumen (71,000 tons) and paraffin wax (8,000 tons), and was 18 per cent of the total U.K. production of solid petroleum products.

Within recent years the Pumpherston refinery has been overhauled and brought up to date. New crude oil distillation units have been erected, and a new extraction plant has been set up. A new plant for the production of detergents has just been completed. The present capacity of this plant is about 3000 tons of detergents per annum. Plans for an important extension of the Grangemouth refinery, which will also provide for the derivation of a number of chemical products, are under consideration.

Iron and Steel

Steel production in Scotland suffered less than the rest of the U.K. from the fuel crisis in 1947. The output of ingots and metal for castings rose by 7 per cent from the 1946 level while production in Britain, as a whole, remained practically static. The following table brings up to the end of 1947 the information on production given in last year's review:

PRODUCTION OF STEEL INGOTS AND METAL

Year	Production (mill. tons)	Percentage of U.K. production	Indices of Scottish steel production (1935-39=100)
1935-39*	...	1.67	100.0
1940	...	2.02	121.2
1941	...	1.85	110.9
1942	...	1.9	113.3
1943	...	2.03	121.8
1944	...	1.88	111.8
1945	...	1.75	104.8
1946	...	1.76	105.8
1947	...	1.88	112.7

* Yearly average.

(Continued overleaf)

Figures of annual production of pig iron in Scotland are given in the following table.

SCOTTISH PIG IRON PRODUCTION

Year	Production (mil. tons)	Percentage of U.K. production	Indices of Scottish pig iron production (1935-39 = 100)
1935-39* ...	0.46	8.1	100.0
1940	0.66	8.0	145.2
1941	0.51	6.9	112.6
1942	0.50	6.4	109.3
1943	0.49	6.8	107.3
1944	0.51	7.6	113.0
1945	0.54	7.6	119.4
1946	0.60	7.8	132.8
1947	0.59	7.6	130.4

* Yearly Average

Iron Founding

A survey completed in December, 1947, showed that the total number of iron foundries in Scotland was 183, the majority being in Glasgow and the Falkirk districts.

Approximate output of all grades of iron castings amounts to 32,500 tons per month, needing the supply of 23,700 tons of pig iron and 14,200 tons of scrap. Hard coke is required at a rate of 7000 tons per month. The survey showed that, with few exceptions, the allocations of raw materials were accepted as reasonable, but actual deliveries of both pig iron and coke were irregular. In the case of coke the shortage was ascribed to a lack of railway wagons; in the case of pig iron to a general production shortage together with transport difficulties. In addition, supplies of scrap, particularly of good machinery scrap, remained scarce.

Peat

There are some 2700 sq. m. of peat in Scotland, of which about 100 sq. m. capable of yielding some 300-350 million tons of air-dried peat may be commercially workable. Many of these deposits, however, are situated very far from centres of population and labour, and any attempt to work them would be difficult.

The question of developing Scottish peat resources has recently been studied. By a process developed by Peco, Ltd., it is possible to produce peat briquettes from milled peat. By-products such as peat wax also offer prospects for exports or for home use. Experiments in the production of insulating material are also taking place. In the central industrial belt, however, difficulty has been encountered in maintaining an adequate labour force for hand-cutting. Mechanical methods of winning and processing would ease these difficulties.

Refractories

Scotland makes an important contribution to the U.K. production of refractory products. J. G. Stein & Co., Ltd., Bonnybridge, is the largest manufacturer in Britain of basic

bricks with an output of 17,500 tons per annum. In 1947 the production of fireclay-refractories in Scotland was 360,000 tons, equal to about 40 per cent of the U.K. output. This figure is not the production capacity of the industry, as output was limited throughout the year by shortage of labour, especially miners. The labour force is at present approximately 3600. In view of the continuing heavy demand for refractory products of all types, it is hoped that the special measures taken to overcome the housing problem will result in increased production in 1948.

Linoleum

Scotland accounts for over half the linoleum produced in the U.K., and the main centre of the industry is Kirkcaldy. There is still a very heavy demand, but efforts to produce more are hampered by shortages of raw materials, principally linseed oil and hessian. There was an improved supply of oil in the latter months of 1947. Leading firms in the Scottish linoleum industry are pursuing research into the possibilities of certain substitutes for linseed oil, and another firm is starting to produce (for export only) a linoleum-like floor covering with a plastic compound in place of linseed oil.

Cement

During the spring of 1947, when there was a general shortage of cement owing to the coal crisis, Scotland perhaps suffered more severely than the rest of Great Britain, because of shipping difficulties. There are only four firms manufacturing cement in Scotland. These use locally produced blast furnace slag, locally produced cement clinker, and cement clinker brought by sea from the south of England. Maximum output is about 4500 tons of cement a week.

Industrial Research

Last year's review stated that the volume and variety of industrial research in Scotland was not sufficient to ensure healthy industrial development, and that Scottish manufacturers needed encouragement and help to make the best of the facilities available to them for the application of scientific knowledge to their industries. Since then, the prospects of industrial research in Scotland have very considerably improved.

The branch office of the DSIR was established in Edinburgh in July, 1947, and, in addition to co-operating with other Government departments in Scotland, and with other organisations interested in research and its application to industry, is actively engaged in making contacts with Scottish firms and assisting them to make use of the laboratories and information services of the Department and the research associations.

SPANISH CHEMICAL PROGRESS—II

Spanish-Portuguese Collaboration in Pharmacy*

DR. Vadillo, in later passages in his widely-based study of Iberian pharmaceutical products listed many important organic synthetics now being made in Spain and Portugal including vitamin K. Turning his attention to the inorganic field, he noted that mercury compounds are now being produced on an increasing scale. Now, instead of exporting only the raw material, an important industry was based on products such as calomines, cyanide and oxycyanide, corrosive sublimate, etc. Here, too, some export trade has been developed, and Spanish competition was being felt in the world markets.

Conditions in regard to bismuth salts are not quite so favourable, and, although several factories are now manufacturing them, production is adversely affected by lack of regular supplies of metallic bismuth. This disability exists in other directions also, especially in the lack of chlorine which cannot easily be imported. It is hoped, however, that the position will be easier now that a new chlorine factory is starting operations in Guipuzcoa (Prov.).

Limited Output of Sulpha Drugs

Five factories are making sulphonylamide, -amidopyridin, and -amidodiazol; but the sulphonamides generally are restricted by continued shortage of chlorosulphonic acid. These shortages of certain raw materials for fine chemicals and pharmaceuticals are taken to illustrate the more rapid development of this branch of chemical industry as compared with that of heavy chemicals in Spain.

In some respects growth of the latter has, however, been of considerable help in production of fine chemicals. The increasing manufacture of plastics and synthetic resins in Spain, for example, has stimulated production of pharmaceuticals based on such things as formaldehyde and phenol, e.g., salicylic acid, coumarin, and salipyrine also indirectly the new product, Rubofren (trimethoxy-dioxy-oxotritane), some of which has been exported during the first half of this year.

The recent development of artificial fibres has assisted corresponding development of fine chemicals based on acetic anhydride and acetylation products, e.g., aspirin, for which a new factory has just been put in operation.

Spain has always been noted for its saline resources, especially of common salt, in solid

or liquid form, ensuring among other things adequate supplies of bromine and alkaline bromides, in addition to sodium chloride. Conversely, the growth of certain fine chemicals has assisted similar growth in the heavy chemicals, which Dr. Vadillo exemplifies with anaesthetic ether and hydrogen peroxide, the latter especially being of particular importance in the development of perborates manufacture now established on a large scale in Spain. Here again an export trade can be built up if supplies of caustic soda can be made available.

Reagents and Antibiotics

In the field of pure products and analytical reagents much progress has been made as shown by the statistics which, in the case of acids and ammonia alone, revealed for 1943 output of 225 tons, compared with nil a few years earlier; output of crystalline products and various reagents exceeded 35 tons.

The manufacture of sera, vaccines, and antibiotics has also shown substantial advance, as a result of the research of Profs. Bustinza and Caballero Lopez and others, with streptomycin chloride in solid form from cultures of *S. griseus*. More recently usnic acid, in dextro-crystalline form, has been prepared from *Usnea barbata* (one of the Spanish lichens), and also the sodium salt, both being strongly anti-bacterial.

Streptomycin usnicate appears to be specially effective against the tuberculous bacillus, and has evoked some interest in leading American laboratories. Another interesting product is rutine in crystalline form from the flavonolic glucoside; also quercetine and its sodium salt, with marked antibacterial activity, e.g., against various species of *Mycobacterium*.

Penicillin

Much progress has also been made in Spain with penicillin, for which a small pilot plant has been working for some time in Barcelona. It is proposed, from the experience so gained and in connection with the grant of patent rights by a leading European firm, to establish the manufacture of penicillin on a large scale (with an annual output of some 25 million ampoules of 100,000 units). This would be about three times the estimated consumption for 1949 of pure crystalline penicillin containing 1650 u.o. per mg., stable to both light and heat. The project will cost about 25 million pesetas, and the agreement with the foreign firm includes facilities for study and re-

(Continued overleaf)

* The first part of this review appeared in our issue of July 24, pp. 121-122.

search by Spanish chemists. The cost to the public per ampoule, or 100,000 u.o., will be about 10 pesetas.

The first Luso-Espanol (Portuguese-Spanish) Pharmaceutical Congress, held in Madrid in June, appears to have been entirely successful. (*El Monitor de la Farmacia*, June 20 and July 3.)

Among a long list of resolutions adopted, it was decided to appoint a commission (Luso-Espanol) to study deficit raw materials in the Iberian peninsula; to award prizes at the next congress for the best papers on chemico-pharmaceutical industries based on acetylene derivatives; to publish a *Códec alimentarius* to include official methods of analysis for foods and drugs, and suggested means of better control and standardisation; to urge upon the Governments the publication of a *Flora Medicinal de Portugal y de España*; to form an Hispano-Portuguese Biochemical Society, which would publish a review, and an Iberian Society for the History of Pharmacy, and a Federació Hispano-Lusa-Americana for all pharmacists of Spanish or Portuguese nationality and language (i.e., including S. American).

It was proposed generally to take all necessary steps, from universities downward, to raise the standard and status of

study and training of pharmacists. A commission is also to be set up jointly by the two countries to study unifications or standardisation of methods of biological assay, to be incorporated in the proposed Spanish-Portuguese Pharmacopœia.

Documentation and research in special lines formed the subject of other resolutions, some of which were concerned with medicinal plants and their culture.

In view of the proposed creation of the organisations mentioned, the need for a Cuerpo (body) Nacional de Farmacia (resolution 45) is not very clear. Closer relations with other branches of industry and science, e.g., fine chemicals and chemical industry generally, and medicine, botany, microbiology, etc., were provided for.

The exhibition itself, held in conjunction with the Madrid congress, was divided into six principal sections, of which the historical and the bibliographical-artistic were of particular interest, and occupied in all some 890 square metres, with 96 stands. About 80 of these were furnished by 31 firms. The historical section illustrated the growth of Spanish pharmacy from earliest times, and included a fine collection of Italian ceramic flags and other memorials of the 17th and 18th centuries.

NUCLEAR PHYSICISTS TO SERVE U.S. INDUSTRIES

AN atomic energy division which will specialise exclusively in nuclear engineering problems and whose activities will be directed by Dr. Karl Cohen, former director of the theoretical division of the Manhattan Project Laboratory, has just been formed by the H. K. Ferguson Company, the New York industrial engineers.

Initially, it will accept contracts only from the U.S. Atomic Energy Commission and its subcontractors, but eventually it contemplates undertaking consulting work for private industry. It intends also to work on original problems of nuclear science on its own initiative. It foresees the need in the future of serving as consultants for clients who want to investigate the possibilities and effects of atomic energy applications in their industries, such as the use of radioactive tracers, economic aspects and other atomic engineering problems.

Among its initial assignments, the Atomic Energy division will participate in the engineering and construction of the first peacetime atomic pile now being built by the Ferguson company at Brookhaven National Laboratory, Upton, Long Island, New York. There, Dr. Lyle Borst, designer and director, has announced that the pile is now nearing completion and it is expected that the

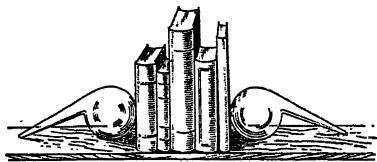
first atomic plant able to make electric power will start running in December. Electrical output is expected to be about 2500 kW.

During the war, the Ferguson company was one of the major participants in the Oak Ridge, Tennessee, atomic development, and designed, built, and operated the thermal diffusion plant used for the production of uranium-235.

ATTACK ON VIRUS DISEASES

DR. Wendell Stanley, Nobel Laureate in chemistry, and founder of modern virus research, has joined the faculty of the University of California as professor of biochemistry. He will direct a new virus research laboratory, the first of its kind to be established by a university. At the last session of the State Legislature an appropriation of \$500,000 was voted for the construction of a special laboratory.

An extensive programme of research on viruses affecting plants, animals and humans will be undertaken. The programme will have ramifications in every field where viruses are known to be involved, particularly in medicine and agriculture.



A CHEMIST'S

BOOKSHELF

Chemical Engineering Economics. By Chaplin Tyler. Third edition. 1948. New York: McGraw-Hill Book Co., Inc. Pp. 321. U.K. price 24s.

For over 20 years this successful text has held a front-rank position in the field. An innovation in the new edition is the collaboration of 14 experts in various fields, which has made the book much more useful and authoritative than its predecessors. Headed by the editor, member of the Development Department, E. I. du Pont de Nemours & Company, the work is a co-operative effort of various authors well co-ordinated so far as subject-matter is concerned. Of the 15 chapters, the first surveys the characteristics of the chemical and allied industries, classified into two groups: production based essentially on change in physical, and in chemical form. The following chapters cover phases of economics, research and development, plant location, plant design, operative investment, process equipment costs, economic balance, heat and power, plant operation and control, cost accounting, market development and research, market organisation and management. The last chapter deals with patents. The book covers a subject, which has otherwise been dealt with very sparsely in published literature. Although written for American conditions, it will certainly be appreciated in this country for its practical applications. The value of the book is enhanced by the inclusion of many figures and tables, a comprehensive bibliography and a full index. The volume will find a place in the libraries of chemical institutes and chemical works.

* * *

Woodfloor. By W. S. Dahl. Published by the author (30 Stanley Road, Mortlake, London, S.W.14). Pp. 120. Price 21s.

The book presents an account of the manufacture of woodfloor, its functions and many modern uses, with special reference to its use in plastics, linoleum, and tinplate polishing and cleaning. Special chapters are added on lignin plastics and uses for unground sawdust and woodwaste. The author, who has spent his life in the timber trade, has collected and made accessible in convenient book form a large amount of

information on this subject, in which he is an expert, and much of the material has not previously been published. The book will therefore serve a useful purpose in pointing the way to an expansion of the uses of wood waste, which is accumulating on such a scale that prize competitions have been arranged to find economic means of dealing with it. The first more mechanical uses have extended into chemical industries, including processes such as the production of alcohol and the new uses for extracted lignin, which latter is finding an ever-expanding field of usefulness. The book, dealing with more than 35 uses and containing more than 50 illustrations, is a useful contribution to a subject of considerable economic importance. It affords a great deal of technical information which has not formerly been readily available.

* * *

Numerous new books on organic chemistry, translated from the German, published and distributed with the consent of the Alien Property Custodian, are announced by Interscience Publishers, New York-London. Among the authors or editors are W. Theilheimer, Ernst David Bergmann, A. Weissberger, and Conrad Weygaud.

Tar Research

Road Tar Bulletin, No. 4, based on research by the Road Research Laboratory, DSIR, and the British Road Tar Association, which the latter organisation has now issued, forms an important link in the series of essentially practical studies of tar in one particular connection. The fourth bulletin provides a very detailed examination of the bases on which depend the adhesive characteristics of tars and consequently their effectiveness as a binder of road surfaces. The text and ample illustrations are well designed to tell the story with great clarity, in a way intelligible to all. It deals at length with the interesting and extremely practical physical problem of securing adhesion between surface dressings and various kinds of aggregate when rain tends to prevent bonding.

American Chemical Notebook

From Our New York Correspondent

ADDRESSING the International Congress of Crystallography at Harvard University recently, Prof. L. G. Berry, of Queens University, Kingston, Ontario, said that he had "grown" minerals in his laboratory to study the framework of atoms under controlled conditions. Prof. Berry said that among the minerals thus produced were compounds of lead-antimony-sulphur and copper-selenium, and he had synthesised the minerals by using a water solution at high temperatures and under pressure. With these crystals he had been able to study the "systematic variation" of their properties as chemical composition varied. This enabled him to make observations, under controlled conditions, regarding colour, crystal form, solubility, and other factors.

* * *

Four U.S. Government-owned patents relating to developments in the chemical, drug and plastics fields have been made available by the Bureau of Agricultural and Industrial Chemistry for licensing on a royalty-free, non-exclusive, non-transferable, and revocable basis. One of these patents, No. 2,432,638, offers a method for the isolation of penicillin. Penicillin is present in extremely small quantities in biological fluids, such as the fermentation liquor resulting from the culture of penicillin-producing moulds. The patent covers a method for the recovery of penicillin by adsorption from the neutralised and filtered fermentation liquor on activated carbon. The carbon is then separated from the liquor and the penicillin eluted from the carbon with an aqueous solution of an organic aliphatic alcohol of at least 4 carbon atoms, having a substantial concentration of water; Patent No. 2,435,478 relates to polyamides of polymeric fatty acids and the polyamines obtained by hydrogenation of the nitriles of polymeric fatty acids. The products are hard, resinous solids, or tough, rubbery substances which become hard and resinous at low temperatures and are suitable as bases for rubber substitutes with good low temperature characteristics.

* * *

The other two patents are:—No. 2,436,659, covering a process by which d-saccharic acid is made by nitric acid oxidation of d-glucose. A non-catalytic method is described in which a reaction mixture, containing 50 per cent to 70 per cent nitric acid, is employed at 55° to 90°C. The ratio of acid to glucose is about 3 to 8 moles of acid per mole of glucose. The process avoids the use of expensive catalysts and pro-

duces high yields: No. 2,437,946 describing a method by which prolamines such as zein are made into coating compositions, film, filaments, and moulded plastics. The products are clear, transparent, flexible, and waterproof. The solidifying compositions consist essentially of the prolamine as the film-forming or solidifying agency, with an amide of lactic acid as plasticiser.

* * *

To assist the Colorado Fuel and Iron Corporation, now operating an Army standby plant at Denver, Colorado, to dispose of certain stocks of caustic soda held in storage, the U.S. Office of International Trade last week established a supplemental export quota of 4300 tons of caustic soda for the third quarter of 1948. The action was taken, OIT officials said, at the request of the U.S. Army to keep the plant in condition for an immediate resumption of production in the event of an emergency. Although the plant is strategically situated from a military aspect, it is some distance away from raw material sources and, in addition, high operating costs prohibit competitive selling prices in the caustic soda market. Previously, the price standard used by OIT in considering applications for export licences has barred the firm's products from the export markets. The price regulation will not apply to the supplemental quota.

* * *

The Monsanto Chemical Company's latest financial report discloses that the sales during the six months ended June 30, 1948, showed an increase of 11 per cent over the same period in 1947, and net income amounted to \$7,926,759 (equal to \$1.73 a common share), against \$9,275,133 last year. As in previous reports issued since the Texas City disaster, in April, 1947, earnings to April 16 this year do not include any insurance recovery for loss of profits resulting from destruction of the company's installations at Texas City. Recurrent expenses and certain outgoings to reduce losses which are recoverable under insurance policies have not been charged against earnings. The chairman, Mr. Edgar M. Queeny, states in the report that reconstruction of part of the Texas City plant is nearing completion and full production from that unit is expected to be reached this month. The company has declared the usual quarterly dividend of 50 cents on the common stock, payable September 1, a \$1.00 quarterly dividend on the series B preference stock, and the usual semi-annual dividend of \$1.62½ on the company's series A preference stock.

Home News Items

BoT Nitrate Destroyed.—More than 200 tons of nitrate chemicals belonging to the Board of Trade were destroyed by a fire which occurred at Millwall Docks on Tuesday.

Vesting Date for Gas Industry.—It is expected that the gas undertakings will pass to State ownership on April 1 next year. The Bill giving the Government nationalisation powers received the Royal Assent last month.

Accident at Dyemakers.—When his right arm was caught in a fan, Mr. James E. Garside was drawn into a dye pan and received serious injuries last week at L. B. Holliday & Co., Ltd., dyestuffs manufacturers, Deighton, Huddersfield.

Cornish Tin Resources.—A report, sponsored by the newly-formed Cornish Mining Development Association, is to be sent to the Ministry of Fuel and Power urging the Government to finance assay work in connection with Cornwall's tin and other mineral deposits.

Tin Allocations.—The Ministry of Supply announces the following interim allocations of tin for the second half of 1948, additional to those announced last month. Brazil 420 tons, Ceylon 20 tons, Egypt 165 tons, Finland 100 tons, Germany-Bizone 500 tons, Hong Kong 65 tons, Korea 20 tons, South Africa 160 tons, total 1450 tons.

Copper May Cost More.—The prospect that the maintenance in the U.S.A. of the new price of 23½ cents per lb. for electrolytic copper will enforce some increase in the Ministry of Supply home charge of £132 per ton is considered likely. In sterling equivalent, U.S. copper is now worth £8 more than the British official price.

1000 Tons of Rubber Destroyed.—Four sheds, containing about 1000 tons of reconditioned tyres and rubberised cloth, were destroyed by a fire which lasted for more than eight hours at premises in Wearish Lane, Westhoughton, near Bolton, last week. Several fire brigades were needed to control the blaze.

Council Seeks Chemical Contractors.—Applications are being invited by the Supplies Department of Essex County Council from manufacturers of chemicals and laboratory equipment to be included in the council's list of approved contractors. Particulars are obtainable from the Supplies Officer, Essex County Council, Old Court, Arbour Lane, Springfield Road, Chelmsford, Essex.

Paint Works Explosion.—Mr. H. L. Darnell, chief chemist, Bryce, Weir, Ltd., Watford, was seriously injured last week when a 100 gal. vat of varnish exploded at the works. A youth, Jack Dandridge, of Radlett, received burns on the face and hands.

Chemical Import Duties.—Many changes, including some substantial reductions of Czechoslovakian import duty and some additions to the free list in respect of a wide range of basic chemicals are recorded in the current *Board of Trade Journal*, derived from H.M. Embassy at Prague. Most of the new rates have effect only until the end of the current year.

More British Coal for Sweden.—According to a Stockholm radio report, Lord Hyndley, chairman of the National Coal Board, while visiting Sweden for negotiations with the Government, promised a "substantial increase" in U.K. coal deliveries to Sweden next year. He expressed the hope that Britain would again be able to supply the bulk of Sweden's coal and coke import requirements.

Glaxo in Johannesburg.—Glaxo Laboratories, Ltd., Greenford, Middlesex, announces the incorporation of a new subsidiary company in South Africa under the name of Glaxo Laboratories (S.A.) (Pty.), Ltd. The main office is at 3 Maasco House, 8 Smal Street, Johannesburg. Mr. A. L. Birchley, formerly a home sales executive, has been appointed managing director of the South African company.

Standard for Burettes

British Standard 846, Part 3, covers burettes of 5, 10 and 25 ml. capacity with pressure filling device and automatic zero, for use in micro-chemical work. Full dimensions and tolerances are given. This specification is one of a series for micro-chemical apparatus which is being prepared at the request of the British Laboratory Ware Association.

The apparatus is designed to enable the burette to be filled with standard solution from the storage bottle, to provide automatic zero-setting of the liquid surface in the burette, and to protect the solution in the storage bottle, during transfer to the burette and while in the burette, from contact with the carbon dioxide of the atmosphere. The specification may be obtained from the British Standards Institution, Sales Department, 24 Victoria Street, London, S.W., price 2s. net, post paid.

New Spectrographic Studies

WORKING at the United States National Bureau of Standards, Dr. C. C. Kiess, of the Bureau, and Dr. George Shortley, of the Ohio State University, for the first time have succeeded in measuring precisely the Zeeman effect of neutral nitrogen and oxygen.

When the Zeeman patterns of such metals as molybdenum, tantalum, and manganese, are photographed in the red and infra-red regions of the spectrum, there usually appear also on the spectrograms the patterns of atmospheric nitrogen and oxygen. The relative positions and estimated intensities in the magnetic patterns of these lines have now been determined for the first time from precise measurements of spectrograms by Drs. Kiess and Shortley.

The interpretation of these measurements has afforded an interesting application of the quantum theory to the elucidation of the Paschen-Back effect, the Bureau states. The *g*-values derived for the nitrogen and oxygen energy levels are the first to be announced for neutral atoms of atomic number less than 10, or neon, and are found to conform with those required theoretically for the lighter chemical elements.

SYNTHETIC RESINS

THAT large expansion of production of synthetic resins could now have taken place, but for the delays associated with industrial expansion under present conditions, was made clear by Mr. H. E. Potter, managing director of Bakelite, Ltd., in his annual report to shareholders. The company, the nominal capital of which was recently increased to £1 million, is about to put into production some of the new equipment for the production of phenolic plastics at Aycliffe, Co. Durham. Although construction at the research and development centre at Tyseley will not be complete until next year, the company continues to build up its staff of chemists, physicists and technicians, some of whom may later be occupied with a project for the manufacture of synthetic phenol.

Non-Ferrous Metals in June

Ministry of Supply statistics relating to light metals in June have been issued (in long tons) as follows: Virgin aluminium, production 2528, imports 15,240. Secondary aluminium, production 6403. Uses (aluminium scrap arisings): 20,927, consumption 8549. Aluminium fabrication: 19,566. Magnesium fabrication: 249.

Personal

MR. CHARLES JAMES HENSHAW, Ashton-under-Lyne, retired works chemist of Thomas Kerfoot & Co., Ltd., left £5661 (net £5621).

BRIGADIER-GENERAL WILLIAM FREDERICK MILDREN, chairman of Imperial Paper Mills, Ltd., and a director of Amalgamated Press, Ltd., left £222,403.

MR. W. C. WAUGH, Purley, Surrey, formerly of Lyndhurst, Hubby, near Leeds, chemical merchant, and director of Walter Waugh & Co., Ltd., Albemarle Street, London, and of other companies, left £31,208 (net £27,036).

MR. R. MCCHLERY, former Rhodes Scholar and, since 1926, a member of the Agricultural Department, Salisbury, has been seconded to the Central African Council to take up the new appointment of Central African scientific liaison officer in the United Kingdom, and to establish a Central African scientific liaison office in the British Commonwealth of Nations Scientific Offices, London.

Obituary

SIR CLIFFORD COPLAND PATERSON, who recently returned from Australia, where he had been acting as contact between British and Australian scientific bodies, has died in the Watford Peace Memorial Hospital, aged 68. Educated at Mill Hill School and Faraday House, Sir Clifford spent 17 years on the staff of the National Physical Laboratory before founding the research laboratories of the General Electric Company in 1919. A past-president of the Institution of Electrical Engineers and Faraday Medallist in 1945, his research contributions in a period of some 45 years greatly extended the scope of sources of illumination and means by which illumination can be precisely measured.

During the war he co-ordinated the activities of a number of teams which afforded notable developments in the use of high radio frequencies which had a practical application in new weapons. He performed equivalent work in similar fields during World War I. In 1946 he was awarded the James Alfred Ewing Medal by the council of the Institution of Civil Engineers for his work in engineering research, and a few weeks ago the Illuminating Engineering Society of America, awarded him their gold medal.

Overseas News Items

Norwegian Aluminium for Russia.—About 1000 tons of aluminium have recently been shipped to Russia from Norway and further consignments are expected to follow as a result of current trade discussions.

Big Soda Production in Poland.—Poland is reported to have produced some 100,000 tons of soda in the current year, sufficient for domestic requirements and to provide an export surplus.

Hungary Increases Fertiliser Output.—Production of fertilisers from the Pét plant in Hungary during April amounted to 28,820 tons, an increase of 700 tons on the previous month.

Cement and Chemical Controls Removed.—In recognition of the great improvement in the output of Portland cement, the Italian Government has abolished all priority allocations. For the same reason the trade in fertilisers and calcium carbide is to be free.

Record World Oil Output.—According to statistics collated by *The Oil Forum*, daily average crude oil production throughout the world in April reached a new record yield of 9,090,075 barrels, which is 13 per cent higher than during the same period in 1947.

Food Regulations Offence.—A Renter report from Lagos states that the Nigerian Supreme Court has fined the United Africa Company, a subsidiary of Lever Brothers and Unilever, Ltd., a total of £90,000 for overcharging under the food regulations. It is understood that the company will appeal.

Iranian Oil Yields.—Crude oil produced in Iran by the Anglo-Iranian Oil Company in June amounted to 2,041,000 tons. This compares with 2,228,000 tons in May. Total production for the six months ended June 30 last was 11,476,000 tons, against 9,399,000 tons during the same period of 1947.

Italy's Synthetic Wood Production.—The Italian Association of Synthetic Wood Manufacturers has appealed to the Government to stop the importation of synthetic wood products. During the latter half of last year Italian producers of masenite, faesite, etc., experienced difficulty in selling their products and stocks rapidly accumulated.

Brazilian Fertiliser Imports.—Brazilian imports of calcium superphosphates in the first two months of 1948 totalled 11,918 metric tons, valued at \$415,800, according to customs statistics. This material was among the 10 commodities registering the greatest increase in volume over those imported in the corresponding period of 1947.

Quartz Deposits in Norway.—Large deposits of quartz crystals are reported to have been discovered in Bardu in Northern Norway. The area is said to contain the largest occurrence in Europe.

More Sunflower Seed.—It is officially estimated that the 1947-48 sunflower-seed crop in Argentina will total 988,100 metric tons, comparing with 688,200 tons harvested last season.

Canada Increases Petroleum Output.—According to the Bureau of Statistics, Canadian production of refined petroleum products in April, totalled 5.81 million barrels, an increase of 842,000 barrels on the April, 1947, output.

Dyestuffs Plans.—Dyestuffs production by Czechoslovakian factories, virtually all of which are now State enterprises, is reported to have totalled 24,000 tons in 1947. Present production plans propose that current production should be doubled by 1953.

Canadian Fertiliser for Egypt.—An agreement, recently concluded between several Canadian companies and the "Credit Agricole d'Egypte," provides for the shipment to Egypt of 50,000 tons of fertiliser each year from July 1948 until June 1950.

Oil Official Released.—Mr. E. Boden, general manager of the Unirea Oil Company in Rumania, who was arrested by the Rumanian security police last week, has now been released. While in custody he was questioned at length on the activities of his company.

Italy's Power Production.—Italy is at present the world's fourth largest producer of hydro-electric power. Since the beginning of the year output figures (in million kilowatts) were: January 1476, February 1449, March 1480, April 1525, May 1636 and June 1744.

Rising Sulphur Production.—Production of native sulphur in the U.S.A. in May, 409,580 tons, was 4 per cent greater than in the preceding month and 9 per cent greater than in May 1947. Stocks decreased 40,640 tons during the month, and were 6 per cent lower than on May 31, 1947.

Canadian Lead and Zinc Prices.—Prices of lead and zinc have been raised by 2 and 3 cents a lb. respectively to 18.75 cents for lead and 14.75 cents for prime Western zinc delivered, the Consolidated Mining and Smelting Company of Canada announced this week. All other grades of zinc have been increased by a similar amount.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

FORTIOR LTD. (formerly **FORTIOR METAL HARDENING CO., LTD.**), Mitcham, metal hardeners, etc. (M., 14/8/48).—June 18, deb., to Lloyds Bank Ltd., securing all moneys due or to become due to the Bank; charged or. Fortior Works, Willow Lane, Mitcham, and general charge. Nil. Nov. 20, 1946.

SEMENYIH RUBBER ESTATE, LTD., London, S.W. (M., 14/8/48). July 5, three charges, to Malayan Union Government Industrial Rehabilitation Finance Board securing all sums which the chargees may be called upon to pay under or by reason of a guarantee; charged on rubber estate in Semenyih, Negri Sembilan. *Nil. April 22, 1947.

SUNGEI TIRAM RUBBER ESTATE, LTD. London, E.C. (M., 14/8/48).—June 23, charge, pursuant to an agreement dated May 4, 1948, securing to Industrial Rehabilitation Finance Board all sums which the chargees may be called upon to pay under or by reason of a guarantee; charged on land known as Sungei Tiram Rubber Estate, Kota Tinggi Road, Johore. *Nil. Nov. 11, 1947.

ANGLO-AMERICAN PHARMACEUTICAL CO., LTD., Croydon. (M., 14/8/48.) June 30, first debenture and a collateral Land Registry charge, to Westminster Bank Ltd., each securing all moneys due or to become due to the Bank; respectively charged on 9, 59 Dingwall Road, and land and buildings at rear of 11 Dingwall Road, Croydon, and general charge, and on land at Wellesley Grove, Croydon. *£4850. January 13, 1948.

Company News

The nominal capital of **Kent Chemical Co., Ltd.**, Station Road, Tenterden, has been increased beyond the registered capital of £100 by £4900 in £1 shares.

New Companies Registered

Smith-Morgan & Co. (Export), Ltd.—Private company. Capital £10,000. Manufacturers, importers and exporters of chemicals, waxes, paints, varnishes, polishes and preservative coverings, etc. Directors: Wilfred Smith and James B. Morgan, 10 Cranbrook Rise, Ilford. Reg. office: 16 Philip Lane, Eastcheap, E.C.3.

Duckham's Associated Products, Ltd. (455,852).—Private company. Capital £100. Manufacturers, importers and exporters of chemicals, soaps, solvents, insecticides, petroleum products, etc. Directors: J. E. Duckham, A. N. Duckham, G. T. Joyce, A. C. Pepper, H. B. Taylor and J. C. Gardiner. Registered office: Capel House, New Broad Street, E.C.2.

Colour Applications, Ltd. (457,204).—Private company. Registered July 3. Capital £10,000. Manufacturers of and dealers in dyestuffs, fine colours, earth colours, chemicals, paints, pigments, printing inks, etc. Directors: Alexr. J. Mackenzie, James E. Hall, Leslie S. Mackenzie and Wm. J. W. Webster. Reg. office: 7 Chesham Place, S.W.1.

Young & Fogg Rubber Co., Ltd. (455,994).—Private company. Capital £10,000. Producers and dealers in goods made from latex, natural or synthetic rubber, etc., casein or cellulose acetate or plastic chemicals, etc. Directors: A. W. P. Fogg, 4 Birchwood Road, S.W.17, W. H. G. Young, E. S. Fogg, F. A. Marten and Wm. T. Anderson.

Duncan, Flockhart & Co., Ltd.—Private company. Registered in Edinburgh June 28. Capital £130,000. To acquire the business of manufacturing wholesale and retail chemists carried on by Henry J. Baker, Robert L. Kirkcaldie, Henry G. Baker and William J. Gray as "Duncan, Flockhart & Co." Directors: R. L. Kirkcaldie, W. J. Gray, Henry J. Baker, and Henry G. Baker. Reg. office: 104 Holyrood Road, Edinburgh.

Chemical and Allied Stocks and Shares

WITH stock markets slightly more active, values in most sections strengthened, although the best prices were not fully held. Among British Funds 3 per cent Electricity stock eased to 101. after touching the new high level of 101 1/16. Industrial shares responded to better demand, attention being drawn to

the fact that in many instances yields are now at their most attractive levels since the end of the war. Nevertheless, prices receded later in the week.

Imperial Chemical have strengthened to 43s. 6d., sentiment still reflecting the directors' view that the 10 per cent dividend should be maintained on the larger capital. Dunlops touched 71s. 9d., United Molasses 47s. 6d., and the units of the Distillers Co. 26s. 9d., but later prices reacted slightly. Business around 20s. 3d. took place in B. Laporte 5s. ordinary, Albright & Wilson were marked 28s. 3d., Fisons were 58s. and W. J. Bush ordinary shares, which are firmly held and do not change hands frequently, have been dealt in around 85s. Greeff-Chemicals Holdings 5s. shares transferred at 14s. 6d. and Monsanto Chemicals 5s. ordinary were 58s. 1½d. Burt Boulton & Haywood have shown business at 26s. 9d. and William Blythe 3s. ordinary marked 18s. 6d.

Elsewhere, however, British Match shares eased to 34s. 6d., Triplex Glass 10s. ordinary strengthened to 24s. 10½d., the market expecting the past year's results to show higher profits, although, owing to dividend limitation, shareholders will probably not receive more than the previous year's 10 per cent. British Indestructo Glass 2s. shares have remained steady at 3s. 3d. on further consideration of the past year's improved results. At 47s., British Aluminium held their recent improvement, General Refractories have been steady at 21s. 6d., Amalgamated Metal shares also little changed at 18s. 10½d., and British Oxygen, after easing to 97s. 6d., firmed up to 98s. 1½d. Turner and Newall were 74s. 6d. and Murex, at 86s. 3d., were helped by the full results.

British Glues & Chemicals 4s. ordinary held steady at 18s. 9d., it being pointed out in the market that there would have to be a very heavy reaction in profits to necessitate a future cut in the 25 per cent paid in each of the past two years. Fully 85 per cent has been earned on the shares. Lever & Unilever at 48s. 9d. have remained firm on further consideration of the consolidated accounts, while Lever N.V. were 49s. 6d.

Iron and steel gained a few pence, helped by the better trend of markets, United Steel being 27s. 9d., Dorman Long 30s., and Guest Keen, helped by the higher profits and maintained 11 per cent dividend, rose to 46s. Babcock & Wilcox firmed to 66s., and T. W. Ward to 57s. 9d. while George Cohen 5s. shares (19s. 9d.) were helped by the advance in profits and 20 per cent dividend. Boots Drug have rallied well to 50s. 9d., and British Drug Houses 5s. ordinary strengthened to 8s. 9d. Beechams

deferred were firmer at 19s. 7½., Sangers 29s. 9d. and Timothy Whites 35s. British Xylonite were £5½, British Industrial Plastics 2s. shares 6s. 10½d., De La Rue 38s. 9d. and, following the latest developments, P. B. Cow shares have moved up to 17s. 6d.

Oils became irregular, with ordinary Anglo-Iranian and Shell lower on balance.

British Chemical Prices

Market Reports

ACTIVITY in the industrial chemical market remains under the influence of the holiday season but an increasing interest in new business is already noticeable and delivery specifications and existing contracts are again receiving the attention of consumers. Export trade has hardly been affected by seasonal influences and the volume of overseas inquiry is reported to be very satisfactory. So far as values are concerned there have been no important price changes and most sections of the market continue on a firm basis and the supply position, too, is unchanged with the soda alkalis continuing tight. The coal-tar products market is without feature and any contraction in activity is seasonal.

MANCHESTER.—Trading conditions on the Manchester chemical market during the past week have been livelier, after the seasonal lull. Bigger supplies of both light and heavy chemicals have been moving into consumption at Lancashire textile and other using establishments against orders already on the books. Replacement buying, covering a fairly wide range of products, has also been more in evidence. All the alkali products are wanted in substantial quantities and in some of them a tight supply position continues. Inquiry on export account has been of fair extent. A certain amount of forward buying has been reported in the fertiliser trade, and in the tar products market the demand for most lines has been steady.

GLASGOW.—Business in the Scottish chemical market has remained quiet, although conditions are gradually returning to normal after the holidays. Normal conditions are likely to prevail during the coming week. There has been a heavy demand for sodium chlorate and for substitute weed-killers of a non-poisonous type. The demand for solvents and all classes of coal-tar products has been well maintained. In the export market there has been a steady demand for all classes of chemicals, with demand for bleaching powder still far exceeding available supplies.

Industry and the Profits Tax

Present Scale of Assessments and Allowances

NOW that the seasonal influx of company reports adds weight to the mailbags and occupies more than the usual amount of Press space, the term "profits tax" appears with unfailing regularity. This circumstance calls for a brief survey of the operation of the levy in its present form, as certain important changes in the applicability of the tax—originally the National Defence Contribution—have been made by three Finance Acts, two passed in 1947 and one this year.

The present rate of taxation is 25 per cent on profits distributed to shareholders and 10 per cent on profits placed to reserve or used in the business. These rates apply to profits made after December 31, 1946. Profits up to that date are taxable at the old rate of 5 per cent for companies and 4 per cent for other concerns.

Special Deductions

The wear-and-tear percentage allowances for machinery or plant (the term is a wide one including motor vehicles, fittings and fixtures) are claimable under the Profits Tax scheme just, as they are under the Income Tax regulations.

The allowances for the Income Tax Act 1945, now apply also to Profits Tax, and comprise the "initial allowance" of 20 per cent of the capital expenditure where machinery or plant (new or second hand) is installed; the "initial allowance" for new industrial buildings of 10 per cent and 25 per cent per annum for buildings erected during the past 50 years and the "balancing allowances," given where fresh machinery is installed before the capital expenditure on the old machinery has been fully taken by the ordinary allowances.

What is known as "rehabilitation expenditure" is allowable, and includes such items as the return of evacuated businesses to former or other locations, the re-adaptation of buildings, machinery or plant from war to peace time pursuits and the removal of A.R.P. installations, although there are time limits for these deductions. These limits have been altered by the 1948 Finance Act and the applicant has now been allowed until March 31, 1952, to complete any unfinished work of this type and qualify for allowances, provided he renders a preliminary statement to the Tax Commissioners before the end of March next year.

Expenditure on salaries, materials, repairs and maintenance in connection with scientific research is allowed as a trading

expense, and capital expenditure on pilot plants and laboratories is also allowed by instalments spread over five years.

In addition contributions, even of a capital nature, made to a college or university, etc., for technical education, are deductible, if the recipients are engaged upon activities connected with the taxpayer's trade. Expenditure in obtaining a patent or registering a design or trade mark can also be deducted.

For a director-controlled company, deductions for directors' salaries are restricted to 15 per cent of the profits (with a maximum of £15,000) computed before remuneration is made, or £2500, whichever is the greater.

This restriction does not, however, apply to full-time directors who do not own more than 5 per cent of the ordinary share capital.

Profits up to £2000 per annum are exempt from Profits Tax, and relief can be claimed where profits exceed £2000 but are under £12,000. This rebate is calculated on one fifth of the difference between the actual profits and £12,000. For example, if the actual profits amounted to £4000, this is deducted from £12,000 and one fifth of that £8000 difference (£1600) is in turn deducted from the actual profits—which means that £2400 would be liable for tax.

Originally, investment income was not assessed under Profits Tax. This has now been changed and all such income is chargeable, except income already taxed e.g. coming from companies already chargeable with Profits Tax. It should be noted, however, that this is taken into account in computing the £2000 for exemption purposes and in connection with the abatement provisions.

Assessment Procedure

Assessment procedure approximates closely to Income Tax rules but there are certain important differences. For example, profits are for the current year and do not relate to the preceding year's income as under Schedule D (I.T.); the annual value where premises are owned is not deducted for Profits Tax as it is for Income Tax and while Profits Tax payments are deducted for Income Tax, Income Tax payments cannot be deducted for Profits Tax.

On December 31, 1946, individuals and partnerships—small concerns—were taken out of this taxation field, as the tax yield from these firms had always been less than 5 per cent of the whole product of the tax.

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2, at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Azo-dyestuff.—Imperial Chemical Industries, Ltd., and M. Mendoza. Dec. 5, 1945. 604,831.

Azo-dyestuff.—Imperial Chemical Industries, Ltd., and M. Mendoza. Dec. 5, 1945. 604,832.

Anthraquinone dyestuffs.—Imperial Chemical Industries, Ltd., and W. W. Tatum. Dec. 5, 1945. 604,833.

Adhesive compositions.—Imperial Chemical Industries, Ltd., T. J. Meyrick, and J. T. Watts. Dec. 5, 1945. 604,834.

Continuous manufacture of nitroglycerine and the like explosive liquid nitric esters.—Imperial Chemical Industries, Ltd., and F. A. F. Crawford. Dec. 7, 1945. 604,874.

Manufacture of pigments.—Imperial Chemical Industries, Ltd., and J. Glassman. Dec. 7, 1945. 604,875.

Conductive vitreous articles and their manufacture.—British Thomson-Houston Co., Ltd. Dec. 11, 1944. 604,878.

Copolymers of vinyl compounds.—British Thomson-Houston Co., Ltd. Dec. 11, 1944. 604,879.

Preparation of 5-diethylamino-2-pentanone.—U.S. Industrial Chemicals, Inc. Feb. 21, 1945. 604,884.

Sulphonamide derivatives.—Wellcome Foundation, Ltd., and T. Dewing. Dec. 10, 1945. 604,901.

Insolubilisation of N-alkenoxy-methyl polyamides.—Imperial Chemical Industries, Ltd. Dec. 8, 1944. 604,902.

Synthetic resin compositions for low pressure paper base laminates and wood surfacing.—American Cyanamid Co. March 2, 1945. 604,903.

Polyhydric phenol-aldehyde resins used as adhesives in bonding plywood and the like.—Pennsylvania Coal Products Co. Oct. 19, 1943. 605,186.

Polyhydric phenol-formaldehyde resin adhesives.—Pennsylvania Coal Products Co. July 15, 1943. 605,187.

Devices for the production of pressure impulses for transmission through a liquid aqueous medium.—I.C.I., Ltd., E. Jones, and A. J. Lowe. Sept. 6, 1944. 605,189.

Manufacture of vat dyestuffs.—Soc. of Chemical Industry in Basle. Jan. 12, 1944. 604,916.

Manufacture of azo-dyestuffs.—Soc. of Chemical Industry in Basle. March 28, 1944. 604,921.

Condensation of metallic vapours.—Soc. d'Etude pour L'Industrie due Magnesium. April 4, 1944. 604,924.

Insecticidal compositions containing halogen-containing organic compounds and the treatment of materials therewith.—Geigy Co., Ltd., I. E. Balaban, and F. K. Sutcliffe. April 28, 1945. 604,926.

Pressure die-casting machine.—Plasco, Ltd. Jan. 26, 1945. 605,203.

Method of improving the adsorbent properties of alumina.—Compagnie de Produits Chimiques et Electro-Metallurgiques Alais, Froges & Camargue. Oct. 12, 1944. 604,947.

Manufacture of agglomerated products from refractory materials.—Soc. Anon. des Manufactures des Glaces et Produits Chimiques de Saint-Gobain, Chauny & Cirey. July 9, 1941. 605,215.

Apparatus for mixing vaporised fuel with coal gas.—T. W. Ward, Ltd., and B. M. Lovey. Dec. 10, 1945. 604,953.

Process for the catalytic treatment of hydrocarbons.—C. Arnold. (Standard Oil Development Co.) Dec. 10, 1945. 604,959.

Production of magnesium thiosulphate and magnesium oxide from dolomite.—American Zinc, Lead & Smelting Co. Jan. 19, 1945. 604,976.

Manufacture of highly polymeric linear esters and the production of filaments, fibres and the like therefrom.—I.C.I., Ltd., J. G. Cook, J. T. Dickson, A. B. Lowe, and J. R. Whinfield. Dec. 11, 1945. 604,985.

Method of making cellular synthetic resin material.—United States Rubber Co. Feb. 2, 1945. 605,023.

Process for the manufacture of halogenated hydroxybenzamides of the hetero-cyclic series.—P. May. (Sandoz, Ltd.) Dec. 12, 1945. 605,031.

Gas turbine plant.—English Electric Co., Ltd., and E. G. Sterland. Dec. 13, 1945. 605,080.

Gas turbine plant.—English Electric Co., Ltd., and E. G. Sterland. Dec. 13, 1945. 605,081.

Acetylene generators.—Volcan Soc. Anon. June 15, 1945. 605,087.

Method of regulating a gas turbine plant.—Maschinenfabrik Oerlikon. Feb. 9, 1945. 605,088.

Lining tanks for the storage of acids or like liquids.—Santex, Ltd., L. H. Griffiths, and P. A. Chennell. Dec. 14, 1945. 605,094.

Aluminium base alloys.—T. F. Bradbury. Dec. 14, 1945. 605,095.

Production of perforated sheets of thermoplastic resin compositions.—I.C.I., Ltd., and W. E. F. Gates. Dec. 14, 1945. 605,105.

Production of substituted tetrahydropyrans.—I.C.I., Ltd., J. G. M. Bremner, and D. G. Jones. Dec. 14, 1945. 605,107.

Manufacture of trichloromethyl diaryl methanes.—E. I. Du Pont de Nemours & Co. Dec. 14, 1944. 605,108.

Gas turbine power plants.—A.G. für Technische Studien. Dec. 29, 1944. 605,116.

Silicone resin compositions.—British Thomson-Houston Co., Ltd. Dec. 23, 1944. 605,218.

Manufacture of vat dyestuffs.—Ciba, Ltd., and W. W. Groves. Dec. 18, 1945. 604,981.

Dyestuff preparation for printing or dyeing textile fibres.—Durand & Huguenin, A.G. April 2, 1941. 605,314.

Alloys of the aluminium-nickel-iron base type, and methods of improving aluminium-nickel-iron base type alloys.—Indiana Steel Products Co. July 8, 1943. 605,436.

Steel articles for use at low temperatures.—Electro Metallurgical Co. Jan. 16, 1943. 605,440.

Silicate plastics and methods of preparing them.—Haveg Corporation. April 13, 1943. 605,441.

Preparation of diaryl mercury compounds.—F. J. Sowa. June 4, 1943. 605,442.

Insecticidal detergents, the application thereof and materials or articles treated.—J. R. Geigy A.G. Oct. 13, 1943. 605,317.

Resolution of racemic α -hydroxy- β - β -dimethyl- γ -butyrolactone.—Merck & Co., Inc. Nov. 27, 1943. 605,444.

Polymeric materials.—E. I. Du Pont de Nemours & Co. Nov. 19, 1943. 605,445.

Polymeric materials.—E. I. Du Pont de Nemours & Co. Nov. 19, 1943. 605,446.

Polymeric materials.—E. I. Du Pont de Nemours & Co. Nov. 19, 1943. 605,447.

Electro deposition of manganese.—Electro Manganese Corporation. Feb. 1, 1944. 605,448.

Manufacture of substituted aryltrihalo-genethanes.—Geigy Co., Ltd., I. E. Bala-hau, and F. K. Sutcliffe. Dec. 8, 1944. 605,318.

Calcium alginate containing jellies.—H. F. Angermeier. March 5, 1945. 605,455.

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A Digest of Safety Measures

THE overriding necessity of rendering all chemical processes as safe as the nature of the materials and procedure permit is tacitly acknowledged at all times; it gains a more active recognition when some tragic occurrence has driven home the lesson of the deadly destructive forces which lurk within many familiar chemicals. Such a lesson was tragically demonstrated little more than a fortnight ago in Germany and has directed attention afresh to the widening literature designed to promote safety in chemical works, a subject to which this country has contributed more than most others.

This, however, is one of those aspects of science in which the advancement and wellbeing of one country is not an adequate goal and all relevant literature which is published is capable of rendering chemistry and chemical industry less hazardous, and therefore more fruitful, without limitation by national boundaries.

There is fresh evidence of this universality in "Veiligheid en Chemie," recently published by the Dutch State Mines, of Heerlen, whose Dr. H. A. J. Pieters is the author. This is a compendium of practical safeguards in chemical work which has derived its information quite impartially wherever authoritative work has been done and there is more than one acknowledgment of indebtedness to the Department of Scientific and Industrial Research and other English and American

sources. It is, unfortunately for some of us, written in Dutch, but since publication in another language has never yet offered serious impediment to the wide dissemination of any vital information which science has needed it is unlikely that this work will be unregarded by managements and safety officers of other countries.

One of the surprising circumstances on which this book helps to focus attention is the extent to which chemical workers are required to safeguard themselves by their own adroitness and observance of routine safety rules. That, it may be objected, is a common condition for survival in a fast-moving mechanised civilisation. There is, however, the difference that in the chemical laboratory, and to some extent in the chemical works as well, more than one process is likely to be taking place at the same time and attention cannot be so finely focused as it is, for example, on the hazard of an approaching 'bus.

It is evidently the view of Dr. Pieters that the more safety measures can be systematised the nearer will we approach to the ideal represented in the title of the book. It deals with preventive measures first and gives hints to the chemist how to organise his daily work so as to minimise the hazards when working with glass, gas, electric current, when solids or fluids take fire, and when working with composite explosive materials as air and gas, ether, ether peroxide, etc. The book does not omit the

On Other Pages

Leader :

A Digest of Safety Measures ... 237

Notes and Comments :

Migrant Industries ... 239

Another Antibiotic? ... 239

Science and War ... 239

Danger of the Short Cut ... 240

German Assets in Spain ... 241

New Canadian Minerals ... 241

I. G. Farben Disaster ... 241

Indian Steel Plans ... 241

British Council Report ... 242

Nationalised Industries ... 242

K.I.D. Changes ... 242

"Rationing" Alkali Exports ... 243

European Coal Supplies ... 243

Batteries and Accumulators ... 244

ERP Allocations ... 244

Deacidification of Glyceridic Oils ... 245

Use of Conductive Rubber in Electrical Heating ... 248

Depreciation and Maintenance—I ... 249

U.S. Work on Synthetic Fuels ... 252

Chemical Explosion Hazards ... 252

Ammonium Nitrate "Not an Explosive" ... 253

Filtration by Sintered Glass ... 256

A Portable Reflectoscope ... 257

Spanish Plans to Raise Nitrogen Production ... 258

Fertiliser "Famine" in S.E. Asia ... 259

Empire Needs Fertilisers ... 260

Ceylon May Make DDT ... 260

Ceylon Copra Agreement ... 260

Rhine Valley Oil ... 266

U.S. Oil Plans in the M.E. ... 266

Belgian Trade Prospects ... 266

most familiar factors at the root of accidents, and indicates how to circumvent them. The range of materials dealt with comprehends practically all the familiar chemicals, such as concentrated sulphuric, nitric or fluoric acids, hydrogen peroxide, phenol, mercury, carbon bisulphide, arsenic, lead, phosphorus, chloride compounds, chromic acid, aliphatic and aromatic compounds, carbon monoxide, as well as the asphyxiating gases such as phosgene, chlorine and nitrous oxide.

Careful study has also been given to individual general protective appliances and toxic tests and the responsibilities of a chief chemist in ensuring that all such safeguards are fully comprehended and observed and that the physical equipment is always adequate and in a state of readiness. Deserving of more attention because the risks are not visibly apparent are Dr. Pieters's observations on disposing of or safeguarding toxic or inflammable vapours, not omitting his reiteration that vessels containing fluids with vapour tension, not uncommon at laboratory or works temperatures, must not be completely filled nor exposed to direct sunlight. The official explanation of how the inferno at Ludwigs-haven began has grimly underscored these passages, since the book was written. A detailed description of safety measures to be applied in using autoclaves, allowing for the continually changing working tem-

peratures is equally worthy of attention. The practice rigidly observed in the States Mines establishments of showing by different colours of the bottles the nature of the contents—acetylene (yellow), hydrogen (red), oxygen (blue), nitrogen (green), and non-inflammable gases (grey), is a practical measure which could be more widely adopted. Bottles containing acetylene must, he notes, be upright and there must be no oil or fat in contact with the valve.

The sections to which attention is most likely to be given in present conditions are those dealing with the routine measurement of small particles or quantities of harmful material in the atmosphere and the estimation of low concentrations by semi-micro analysis, calorimetric and physical tests. These take into account the contribution contained in the survey by Morris B. Jacobs (*The Analytical Chemistry of Industrial Poisons*, etc., New York, 1944) and to other treatises in English. Due attention has been paid to the alarm system which detects small concentrations of carbon monoxide, hydrogen cyanide, hydrogen sulphide and various other toxic contaminations in the atmosphere. This, now being developed by Philips Electrical, Ltd., makes very effective use of the Wheatstone bridge to signal the presence of the toxic gas or vapour. This section also usefully correlates the essentials of "Methods for

(Continued on page 240)

NOTES AND COMMENTS

Immigrant Industries

UNCONFIRMED reports that a number of American industrial groups have already received the approval of the Board of Trade for their plans to set up production departments in this country call to mind a distinct prospect that the reported translation to Bristol of an offshoot of the U.S. carbon black industry may be the precursor of more chemical "migrants." While all such projects are said at the moment to be contingent upon assurances being given that earnings of these guest industries will be convertible into dollars—there is to be a European fund of \$300 million for that purpose—that is likely to appear to anyone acquainted with the complexity of the task of getting material authorisations in present conditions here as being the least of the immigrant's problems. That there has always been scope for foreign enterprise and technology is evidenced in success with which such undertakings as the English Monsanto group has been assimilated and the benefits it has conferred. But even Monsanto might think twice had the decision to be taken to-day, especially in the light of adverse publicity, of which the letter from Mr. J. H. Wootton-Davies to *The Times* on Wednesday is not an isolated example. It describes how his attempts to instal here an American soapmaking plant, capable of continuous operation and of effecting a 75 per cent saving in fuel, were successively frustrated by the Ministries of Food and Supply. Those objections were gradually overcome—and to-day, the plant reposes in a Liverpool warehouse because the authorities will not sanction the use of 45 tons of steel to provide a housing for it. This evidently is not the most propitious moment for a return voyage of the *Mayflower*.

Another Antibiotic ?

THE possibility that the U.S.A. will lengthen the lead in the sphere of antibiotics which it certainly appears to have enjoyed since the English work on penicillin was placed at the disposal of American laboratories, is suggested by one of the papers presented at the last symposium of

the New York Academy of Sciences. In this, B. M. Duggar, of the American Cyanamid Company, revealed that he had isolated—two years ago—aureomycin, an extract of mould produced in liquid fermentation which appears to have some bactericidal possibilities not exhibited by penicillin or streptomycin. Other papers dealing with clinical results obtained in experimental use of the new antibiotic seem to have afforded a substantial body of evidence of aureomycin's effectiveness in killing certain virus infections, especially those of the eye, against which neither of the other two antibiotics is of use. The College of Physicians of Columbia University have recorded that in 200 cases of ocular infection aureomycin was effective in 158. Possibly even more significant was the evidence which the same group acquired earlier that this new derivative of *aureofaciens* has been used with encouraging results against pneumonia and influenza. Assuming that these indications are confirmed in a wider field, and that some remaining problems, such as the reported instability of the antibiotic in alkaline media, are overcome, the rapidly developing department of applied micology will receive a powerful impetus in a fresh direction. Fortunately, all three antibiotics derive from the same starting point.

Science and War

WHILE no one needs to be reminded just now that the deeply rooted effects of war in nearly every department of human life are not eradicated when fighting ceases, the capacity for seeing that the legacy which has been left is not entirely a disastrous one gets little exercise. As same scientists and technicians are well aware, war did in fact introduce in all their fields an impetus never equalled before. Some are impelled to acknowledge this, as Baird & Tatlock (London), Ltd., has just done in a factual and deeply interesting account—"Measuring the Future"—of some of the highly effective work carried out in their factories and improvised war plants in supplying the exacting and unorthodox needs of the Service departments. Their story is typical

of the achievements of what was done by chemists and scientific instrument makers in many fields during those years and underlines the encouraging fact that "In spite of the destruction and delays of war there have also been very great advances. . . . Nothing has been permanently put back, nothing has stood still, a 'task force' of much improved scientific devices awaits the demands of tomorrow." One thing is clear, that administration and workers alike learned to apply completely unfamiliar techniques at high speed and with an accuracy upon which so often depended not merely a contract, but men's lives. It was admirable training for the sort of economic warfare which involves us now—the successful outcome of which seems all the more assured in the light of what is recorded in this well balanced collection of reminiscence and forecast.

Dangers of the Short Cut

SO wide is the field of potential developments of insecticides, selective weed-killers and some other products of biochemistry that the relatively few new products in common use may seem a rather meagre harvest, exceptionally potent though they are. Those who are most likely to

benefit from additions to the available insecticides may be growing impatient and lately some appear to have been taking short cuts on their own account, without benefit of chemistry. That is indicated by the warning which the Ministry of Agriculture has issued. It admits that certain substances are now known to have the property, when spread on the soil, of rendering plants more or less immune to some of their traditional insect predators. Among these the compounds of selenium, such as sodium selenate, have been found by some growers to kill the eel-worm, the most voracious enemy of the chrysanthemum. The growers, however, had overlooked one of the barriers most familiar to chemists in research of that kind—that selenium compounds are also insidious poison in the human body and are likely to remain active in the soil long after the chrysanthemums have been replaced by a food crop. They, too, may take up sufficient of the toxic selenium to discomfort the human "predator" almost as much as the eel-worm. The Ministry looks forward to the possibility that research may later render useable insecticides which are taken up by the plant but strongly discourages any further amateur attempts to steal a march on the laboratories.

A DIGEST OF SAFETY MEASURES

(Continued from page 238)

the Detection of Toxic Gases in Industry" (DSIR), of several German procedures and of Lunge-Keane's "Technical Methods of Gas Analysis" (New York, 1924). The author himself, in conjunction with his colleague K. Penners, has evolved a special method for revealing spectroscopically the presence of carbon monoxide (and some other gases) by means of hæmoglobin. This method is very attractive in its simplicity.

An interesting and well illustrated section of this "safety digest" deals with various practical ways of determining or removing suspended dusts. A variety of measuring apparatus, the Palmer-device, the impinger, the husk filter, the sugar, anthracene and salicylic acid filter, the labyrinth filter, the oil filter, the electrostatic dust catcher, the so-called cyclon,

the konimeter, the thermic precipitator and the tyndallometer belong to the manifold devices described here. It remains open to doubt, however, whether the dust problem has yet been solved in a satisfactory manner. The essential difficulty is not to determine the dust distribution but to appraise the influence of shifting air currents and their velocity at the openings of the measuring apparatus.

Sufficient has been said to indicate that this compilation from Holland, even without the copious classification of chemicals and their sensitive characteristics with which it concludes, attacks the problem of safeguarding chemical workers on the widest basis. It is not exhaustive and much of it has been written before. The same may however be said of every other form of scientific abstract, without detracting from their great and admitted value.

German Assets in Spain

Sale of Chemical and Electrical Firms

A LIST of German assets in Spain declared subject to expropriation has now been received from Madrid, states *The Board of Trade Journal*.

The assets are classified according to main industries and details of the chemical and electrical sections, giving the names of the firms and their locations, are as follows:—

Chemical Plant: Agfa-Foto, S.A. Barcelona; Boehringer, S.A. Barcelona; Denticlor, S.A. Barcelona; Electro Química de Flix, S.A. Barcelona; Fabricación Nacional de Colorantes y Explosivos, Barcelona; Instituto Behring de Terapéutica Experimental, S.A. Barcelona; Productos Químico-Farmacéuticos, S.A. Barcelona; Productos Químicos Gehe, Barcelona; Productos Químicos Schering, S.A. Madrid; La Química Comercial y Farmacéutica, S.A. Barcelona; Química Española, S.A. Madrid; S.A. de Productos Químico-Farmacéuticos, Barcelona; Tecnofarma, S.A. Madrid; Unicolor, S.A. Barcelona; Tarsia, S.A. Madrid.

Electrical Plant: A.E.G. Iberica de Electricidad, S.A. Madrid; Electrica Rubi, S.A. Barcelona; Osrán, S.A. Fabrica de Lámparas, Madrid; Siemens Industria Eléctrica, S.A. Madrid; Telefonken Radiotécnica Iberica, S.A. Getafe (Madrid); La Electra Industrial, S.A. Tarrasa; Fabricación Nacional de Lámparas, Barcelona; Siemens Reiniger Velfa, S.A. Madrid; Manufactura Iberica de Lámparas Eléctricas, S.A. (Milesa), Barcelona; Telefonken Fabrica de Tubos Electrónicos, S.A. Madrid.

No Open Bidding

It is probable that the expropriated property will be allotted to new owners chosen by the Spanish Government mainly (in the case of industrial companies in which there existed a German participation) for their financial or technical abilities to replace the German element efficiently. The price of purchase will be fixed not by open bidding but by a fixed valuation determined in consultation with the representatives of the Allied Control Commission (i.e., the British, French, and United States Missions).

Further information can be obtained by writing to Ministerio De Asuntos Exteriores, Sección De Bloqueo, Plaza Provincial 1, Madrid, where a German Property Section has been established.

I. G. Farben Disaster

Again denying that war material was being manufactured at the ill-fated I. G. Farben plant at Ludwigshafen, recently devastated by an explosion (*THE CHEMICAL AGE*, August 7), the French authorities last week issued their version of how the accident occurred.

The sun's heat is said to have detonated an ether solution in a railway tanker and the explosion spread to nearby stores of chloride, trichloride and benzol, all of them highly inflammable.

New Canadian Minerals

Titanium and Uranium Located

CONFIRMATION of two important mineral discoveries was issued last week by Canadian Government officials.

A group of engineers searching for copper near Lake Allard, 400 miles north-east of Quebec City, have found what may prove to be, according to Premier Duplessis, in Quebec, "the world's largest deposit of titanium ore."

In addition, a veteran prospector, Mr. Ernest Johnson, has discovered uranium deposits near Gunn Lake, 15 miles north of the gold mining town of Bralorne. This is the first time this metal has been found in British Columbia.

End of Indian Monopoly ?

The right to develop the titanium ore deposits has already been granted by the Quebec Government to Kennco Exploration, a subsidiary of the Kennecott Copper Corporation.

The company will build a 27 mile railway at a cost of \$10 million from the north shore of the Gulf of St. Lawrence to the mineral area and also construct a \$15 million refinery to treat the ore electrolytically.

This titanium supply may break the monopoly which India holds for the metal, of which Canada imports about \$4 million worth annually.

A month ago the same prospector found uranium on a gold mine property and then on Crown land, on which he staked a claim. All uranium ore must be sold to the Federal Government.

INDIAN STEEL PLANS

THE Tata Iron & Steel Company and the Steel Corporation of Bengal have applied to the Government of India for loans of about Rs.200 million and Rs.170 million respectively, according to the *Times of India*.

The loans are for modernisation and expansion of their plants. Tata anticipated that if the request is granted 600,000 tons of additional steel a year will be produced within a period of three to five years.

The Steel Corporation of Bengal would have a capacity increased by 300,000 tons a year at the end of the first stage of their scheme and by a million tons when the third and final stage is reached.

The Government, it is understood, will endeavour to fit these plans into its own scheme for the development of India's steel industry.

British Council Report

Scientific Work in 1947/8

THE growing demand for British Council services in Commonwealth countries and a ten per cent reduction in its grant for 1948-9 are two of the chief reasons, given in the 1947-8 report, for a redeployment of activities which took place during the year.

This meant the withdrawal of services from six countries, accompanied by the closing of provincial offices in several others. On the other hand, work began in New Zealand, India, Pakistan, East Africa and Bulgaria.

Out of the Parliamentary grant of £3.5 million for 1947-8, net expenditure, according to preliminary returns, was about £3.1 millions (£1,705,000 in the U.K. and £1,395,000 overseas), underspending being partly due to the necessity for anticipating the 1948-9 reduction.

Scientific Work

The report's scientific section states that the large volume of scientific bibliographical inquiries and requests for scientific information have made it necessary to amalgamate the science libraries and scientific information services. In the last three months of the year 55 bibliographies were prepared and 30 inquiries from overseas dealt with.

Technical information was supplied on education in chemistry and chemical research in this country in connection with the South American Congress at Santiago. In addition, assistance was given to the convening bodies of scientific conferences held in the United Kingdom, particularly during July and August, when some 16 international scientific conferences were held.

Prof. J. T. Randall, F.R.S., member of the Science Committee, visited Holland, Denmark, Norway and Sweden and made useful contacts with scientists and council officials.

Lecture Tours

Outlining further progress in the scientific field, the report mentions that a conspectus of current scientific research in Britain has been compiled and is maintained with the co-operation of numerous bodies and by visits of council staff to university research departments. This compilation is of great value in advising visitors and in answering inquiries from overseas.

Tours were made by the science staff in Belgium, Holland, Austria and Czechoslovakia to assess scientific and medical needs in relation to the work of the Council, and lectures were given in most countries visited.

Nationalised Industries

Representation Problem

THE Government has invited the boards of nationalised industries to suggest how they should be represented on such bodies as the Ministry of Labour joint advisory council at the Board of Trade. The managements of nationalised industry are at present not represented in the discussions which Ministers hold with industry through the FBI, which is to nominate the representatives of British management on the Anglo-American joint industrial council.

Two possibilities exist. Either the nationalised industries shall form a new federation of their own, or negotiate for membership of the existing organisations. It is not clear whether such boards would be acceptable as FBI members.

K.I.D. CHANGES

THE Board of Trade has made the Safeguarding of Industries (Lists of Dutiable Goods) Order, 1948 (S.I., 1948, No. 1826), which adds to the list of articles liable to duty under Part 1 of the Safeguarding of Industries Act, 1921, further synthetic organic and other fine chemicals.

Amendments to Lists H, H(ii), H (iii) and H(v) are also made by this order. The effect of these amendments is to remove redundant or obsolete items, to make all grades of carbon bisulphide and potassium permanganate liable to Key Industry Duty; to subdivide two items for statistical purposes and to introduce the modern spelling of certain chemical descriptions. The order came into force on August 20, and copies may be obtained from HMSO, price 2d.

This order, says the BoT, should be read in conjunction with the Safeguarding of Industries (Exemption) (No. 7) Order, 1948 (S.I., 1948, No. 1811), and the Safeguarding of the Industries (Reduction of Rates) Order, 1948 (S.I., 1948, No. 1815), both of which also came into force on August 20.

S.I. No. 1811 continues existing exemptions from Key Industry Duty with certain additions and exemptions until December 31, 1948. S.I. No. 1815 reduces the Key Industry Duty rates chargeable on four of the items in the new additional list, in accordance with the tariff commitments entered into in the General Agreement on Tariffs and Trade, 1947. The items concerned and the rates at which they will be chargeable are as follows:

Citric acid (made by fermentation process)—10 per cent. Caffeine and its salts—25 per cent. Emetine and its salts—20 per cent. Theobromine and its salts—25 per cent.

"Rationing" Alkali Exports

U.S. Method of Meeting World Demand

WITH appeals for alkali products from foreign countries calling for quantities far in excess of the total output in the United States, officials of the U.S. Commerce Department's Office of International Trade and a committee from the alkali advisory panel have announced a proposed licensing plan for screening applications.

Six main points are to be studied and, when additional acceptable applications remain beyond the available quota of caustic soda and soda ash, there is to be re-screening from seven more standpoints in an endeavour to meet the overseas demands.

Government control over alkali exports will be required throughout 1948, says the Commerce Department. Domestic needs can be met, but supplies for export will continue tight.

Actual exports of these commodities constitute 7.8 per cent of the caustic soda and 3.5 per cent of the soda ash production in the United States. OIT officials say their licensing presents one of the most difficult problems in the entire export control programme.

Preferential Licensing

The proposed plan would ensure that licences are issued to exporters certain to make the shipments, direct the alkali to most essential uses abroad, minimise effect on the domestic market, reduce the drain on foreign dollar reserves, promote U.S. foreign policy objectives and overseas trade and afford adequate distribution among the exporters.

When these considerations have been satisfied and there still remain *bona fide* applications demanding extra attention, more detailed points would be studied.

In case of oil, another major export item, the United States is releasing more petroleum products to other countries this quarter than was possible during the previous quarter, with a total of 14,575,000 barrels approved for export during this three-month period. Last quarter's total was 13,949,000 barrels.

The quota for each petroleum product (in barrels of 42 gallons) is as follows: Crude oil, 2,220,000; aviation petrol, 1,305,000; other motor petrol, 4,900,000; paraffin, 500,000; gas oil and distillate fuel oil, 4,200,000 residual fuel oil, 1,450,000.

European Coal Supply

Diminishing Dependence on U.S.A.

REVIVING coal production in Europe will make it possible to discontinue U.S. coal export allocations on September 1, the U.S. Secretary of Commerce, Mr. Charles Sawyer, has announced.

The coal export quota system, in operation since 1944, resulted in the largest overseas coal movement in history, which reached a monthly peak of 5 million long tons in August, 1947. Commerce Department officials said that rising Europe coal output has brought a decline in demand for U.S. fuel, which now is being exported at a monthly rate of from 1.5 to 2 million tons.

The end of allocations does not mean that European buyers will find it more difficult to obtain U.S. coal. Officials explained that U.S. mines are expected to produce enough coal of all types in coming months to supply the needs of both foreign and domestic customers. They said that the improved supply situation permits coal for August export to be licensed freely to meet any demands that may develop in excess of the 1.75 million tons previously allocated for that month. The possibility of complete elimination of export controls on coal will shortly be re-examined.

During the coal year, April, 1946, to March, 1947, shipments to liberated areas of Europe totalled 22,877,747 long tons, the Solid Fuels Administration reported. Shipments to other European countries and Africa totalled 4,255,487 long tons.

Commerce Department coal experts attribute Europe's reduced dependence on U.S. fuel to greater production in the Ruhr, British and Polish mines. Poland has requested a loan from the International Bank for Reconstruction and Development in order to modernise its coal mines.

U.S. STEEL SAFETY RECORD

A REPORT issued by the U.S. Iron and Steel Institute, based upon figures supplied by the National Safety Council, states that the 1947 accident rate in the steel industry was the lowest ever recorded.

From 7.19 accidents per million man-hours in 1946 the figure dropped to 6.08 last year and the industry had the third lowest accident rate among 40 major industries, with an average 50 per cent better than all other industries combined.

These statistics are rendered more impressive by the fact that during the period concerned the U.S. steel industry attained its highest peacetime production level.

Batteries and Accumulators

Materials and Production in 1946

REPORT No. 12 (Partial Census of Production, 1946), covering the activities of firms engaged wholly or mainly in the manufacture of batteries or accumulators, and published in the current issue (August 14) of *The Board of Trade Journal* reveals that the value of gross production in 1946 was more than double that of 1937.

Employment and Production

Materials, sub-contracts and output statistics (in £'000) for 1946 are as follows: Value of production (gross output) 15,188; materials, fuels and electricity used, 7639; amount paid for work given out, 75; net output 7474.

The average number of persons employed in 1946 was 14,803, compared with 11,532 in 1937 and the value of the net output of each employed person was £505, against £266 in 1937.

Materials Purchased

The following comparative table is composed of selected items from official statistics relating to the quantity and value of materials, fuel and electricity bought and used by the industry during 1946 and 1937.

	Purchased in 1946		Purchased and used in 1937	
	Quantity Th. cwt.	Cost £'000	Quantity Th. cwt.	Cost £'000
Materials:—				
Lead and alloys of lead:				
Pig, ingots, blocks, bars, slabs, and cakes ...	378	800	473	562
Sheet ...	77	133		
Solder ...	8	87		
Other descriptions ...	208	484		
Zinc and alloys of zinc ...	151	343	—	(a)
Brass (including all alloys of copper other than nickel alloys) in all forms, except finished parts	—	43	12	46
Copper in all forms, except finished parts ...	—	47	2	10
Iron and steel:—				
Bars and rods ...	8	13	3	6
Plates, sheets and strip (including tape) ...	15	29	10	14
Other descriptions, except finished parts ...	—	45	—	6
Rubber in all forms ...	{ 2	43	2	20
	{ —	10		
Ceramics ...	{ 1	9		
	{ —	10		
Bitumen ...	100	66		
Synthetic resins, including moulding powder ...	—	53		
Fuel and electricity:—	Th. tons		Th. tons	
Coal ...	30	80	18	18
Coke ...	7	25	6	10
Heavy fuel oil ...	Th. galls.		Th. galls.	
Petrol ...	139	5	253	5
	198	18	—	(a)
Gas ...	Th. Therms			
All other purchased fuel ...	1,771	64	—	(a)
	—	3	—	21
	Th. B.T.U. (kW hrs.)		Th. B.T.U. (kW hrs.)	
Electricity purchased ...	44,406	175	24,719	70

(a) not separately recorded

ERP Dollar Allocations

54 Per Cent for U.S. Products

AN analytical chart, recently published by Dun & Bradstreet, Inc., New York, indicates that of the \$5300 million to be spent on ERP during the first year, 54 per cent of the allocated funds will be used to buy U.S. products. Of the balance, 36 per cent will be spent on international trading in the Western Hemisphere and 10 per cent will be utilised for administration costs and price adjustments.

So far as industrial goods are concerned, the largest portion of the allocation, \$379.7 million, will be used for the purchase of U.S. petroleum products and America will also supply \$245.3 million worth of coal, \$75.5 million worth of steel, and \$43.3 million worth of electrical equipment.

In addition, more than \$957 million will be spent for bread grains and coarse grains and about \$511 million will be used for buying cotton supplied entirely by the U.S.A. The dollar value of some of the other items that will be bought include: dairy products, \$133.5 million; meat, \$83.6 million; coffee, \$26.1 million, and eggs, \$12 million.

Deacidification of Glyceridic Oils

Economic and Technical Merits of Steam Distillation

By A. E. Williams, F.C.S.

THE chief method of removing the free fatty acids from both vegetable and animal oils and fats has in the past involved the use of a suitable lye, such as caustic soda. In this technique the lye is agitated with the oil or fat, so that the free fatty acids combine with the lye to form soap, more commonly known as "soapstock." When agitation of the mixture ceases, the soap gradually settles and may be run off from the base of the refining vessel.

The great disadvantage in such a method of refining is that the soapstock so formed carries down with it a considerable quantity—often 50 per cent of its own weight—of good neutral oil, thus creating a big refining loss.

Moreover, the fatty acids that can be recovered from the soapstock are not of such high quality as acids recovered directly from the crude oil by distillation; in lye-refining the lye liberates impurities from the oil and these are intermixed with the soapstock.

Due to these reasons there is a tendency in recent years to make increasing use of steam distillation methods for eliminating the free fatty acids from oils and fats; particularly so because the high quality fatty acids obtained from the distillation technique are now in great demand for numerous modern processes. By distilling the acids from the crude oil, superior quality fatty acids are obtained and, simultaneously, there is none of the huge oil-losses that invariably occur with lye refining.

Pure Product for Soapboiling

Considering merely one sphere wherein fatty acids are in great demand, soap-making, soapboilers prefer to use fatty acids of a high degree of purity, for these can be saponified with sodium carbonate instead of caustic soda. A mixture of dark-coloured fatty acids and neutral oil—the so-called "acid oil" of the lye-refineries—is of much less value for soap making, since, without pre-treatment, this is unsuitable for light-coloured soaps.

Another factor which has given an impetus to the substitution of distillation for lye-refining is that many crude oils cannot be profitably deacidified by the latter technique. For example, a crude groundnut oil containing 10 per cent or more of free fatty acidity cannot normally be lye-refined to give a soapstock containing much less than 65 per cent of neutral oil.

Although the theoretical principles of the distillation of fatty acids from crude oils have been known for nearly a century, it is only in recent years that practical methods have been evolved to carry out such principles economically and efficiently on an industrial scale.

Fatty Acid Mixtures

Glyceridic oils and fats all contain mixtures of fatty acids, each acid having its own well-refined boiling point. The boiling points of some typical fatty acids are:—

	Stearic	Oleic	Palmitic
At 40 mm. pressure	267 C.	260 C.	252 C.
At 20 mm. pressure	247 C.	239 C.	231 C.

The boiling point of a fatty acid mixture, such as is always encountered in an oil or fat, cannot be ascertained simply by finding the proportions of the various fatty acids in the mixture.

The boiling point of a mixture of substances dissolved in each other is higher than that of the substance having the highest boiling point.

In the case of mixtures of stearic and palmitic acids the various boiling points, corresponding to the percentages of each acid present, are shown by the curve, Fig. 1. From this it will be seen that the boiling points of the mixtures do not correspond with the values calculated from their respective proportions, shown by the dotted line.

The values for some fatty acid mixture show an increase of 60°C. or more in their boiling points, but in practice these boiling points can be appreciably reduced

(Continued overleaf)

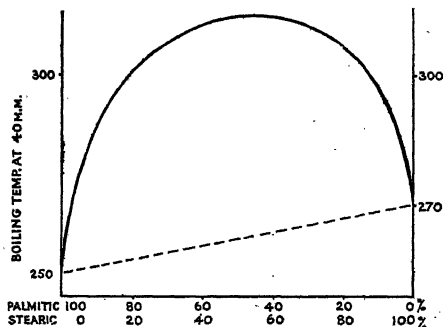


Fig. 1—Boiling temperature, in degrees Centigrade, of varying mixtures of palmitic acid and stearic acid

by the use of steam and by operating under reduced pressure.

Such factors as these have been studied very thoroughly by designers of plants in this sphere, as a consequence, both in Great Britain and abroad, various types of plant have been put into successful operation. Some of these are very similar in design, but differ fundamentally in that some make use of superheated steam, while others employ wet steam.

Steam and Low Pressure

In a typical British process the crude oil is first refined with activated earth to eliminate impurities which would tend to darken both the distilled fatty acids and the deacidified oil. The oil is then treated with steam, under reduced pressure, which volatilises the fatty acids and certain volatile impurities.

In the distillation vessel the temperature used may vary between 240 and 260°C. to suit the nature of the oil under treatment. That part of the plant coming into contact with the fatty acids may be constructed of an alloy consisting of aluminium 92.5 per cent, copper 4 per cent, nickel 2 per cent and magnesium 1.5 per cent.

In the Continental Jurgen's process, introduced primarily to manufacture oils for margarine making, the object is to provide a uniform and very brief heating of the oil, together with a big surface of contact between liquid and steam. In order to separate the distilled fatty acids from the more volatile products the distillate may be first cooled to about 125°C., at which temperature only the fatty acids liquefy; while the remainder of the distillate, which would contaminate the fatty acids, is emitted as vapour and is condensed separately.

Lurgi Apparatus

Another method which has attained a position of some importance consists essentially of distilling the fatty acids from the crude oil by the use of superheated steam, under a high vacuum of 3 to 5 mm. off absolute. This high vacuum is produced by the use of a special type of steam apparatus introduced by Lurgi.

Due to the very high vacuum employed, the distillation temperature is lowered by about 60°C. in comparison with the temperatures necessary with a more normal degree of vacuum wherein water-cooled condensers are used. The high vacuum has also the effect of preserving the quality of the products and preventing their decomposition.

The distilled fatty acids are said to be entirely free from neutral oil, while the special features of the plant make it possible to eliminate practically all the free acids

from the oil, so that for many purposes an after-treatment with caustic lye to remove residual acidity is no longer necessary. In the Lurgi process steam may be used as the heating medium, since the required temperature is relatively low, and the use of gas, oil or electricity for heating is not necessary. This makes for easy control of temperature and overheating of the product is prevented.

With the original Wecker technique, one could use either dry, superheated steam for deacidification, or wet steam. The use of wet steam is said to accelerate the process of distillation and to prevent pyrogenic decomposition during processing. For a few years before 1939 the Wecker process was successfully operated in Germany, and more recently this method has become available in this country through the co-operation of the British firm, Bamag, Ltd., the modern technique being known as Bamag-Wecker's process.

This is based entirely on the volatility of fatty acids and is applicable with the same degree of success for the refining of oils, as it is to the distillation of fatty acids produced by any of the known splitting methods, such as the autoclave, Twichell or fermentation processes.

Steam Reaction Process

A diagrammatic arrangement of the plant used in the Bamag-Wecker process is shown in Fig. 2. The process has for its basic principle the mechanical reaction of wet steam, which comes into sudden contact with the crude oil at a temperature higher than its own. The very fine particles of wet steam expand with almost explosive violence, and in doing so carry away from the oil itself the free fatty acids which are present in the vessel in the vapour phase.

In operation, the crude oil, prior to being fed from the storage tank (A) into the plant, undergoes a pre-cleaning by passing through several screens which retain most of the impurities suspended in the oil. From the storage tank the crude oil goes through the preheaters, via an inspection glass, into the reaction vessel, wherein the separation of the free fatty acids from the neutral oil is effected. The reaction vessel, constructed of special acid-resisting material, is of rectangular shape and has a number of interconnecting chambers. It is heated to a temperature varying between 200° and 230°C., according to the character of the oil or fat being handled.

The oil or fat flows in a thin film along the bottom of the apparatus, and a rapid volatilisation of the acids is induced. Due to the high degree of vacuum maintained in the distillation vessel, the particles of the relatively cool steam injected expand in-

stantaneously on meeting the higher temperature. As a consequence of this violent evaporation of the liquid in the oil, the vaporised fatty acids and all the volatile odour carriers are caused to leave the vessel at a temperature varying between 120° and 150C°. This vapour is then directed into the cooler (E), where the condensation of the fatty acids and other volatile constituents is effected.

The Bamag-Wecker's process in practice has given results which almost reach the theoretically obtainable figures. Formerly it was impossible to expose easily polymerisable oils, such as linseed oil, to high temperatures. By this technique, however, fatty acids of linseed oil as well as other highly unsaturated oils, can be distilled without any decomposition or polymerisation, the iodine value of the distillate remain unchanged. Experience with this type of plant has shown that even when treating waste fats of poor quality no unsaponifiable compounds are formed, so that the oil-losses involved are infinitesimal.

Cheaper Soap Production

The production of pure fatty acids should prove of interest not only to the stearine and olein industry, but also to the soap makers, for the use of such fatty acids permits the employment of the cheaper carbonate saponification. This shortens considerably the time and quantity of steam required for the production of soap in comparison with that caustic soda process.

The fatty acids resulting from the distillation process contain usually only a very small proportion of neutral oil and very little contaminating volatile matter, for the

latter can often be separated from the fatty acids by condensing at different temperatures.

A process developed by Heller differs from any of the foregoing in that the free fatty acids which are volatilised only with difficulty, are esterified with coconut oil or a similar oil having a big proportion of easily volatilised acids. By this means, a quick distillation of the fatty acids difficult to volatilise, such as are found in groundnut oil for example, is obtained.

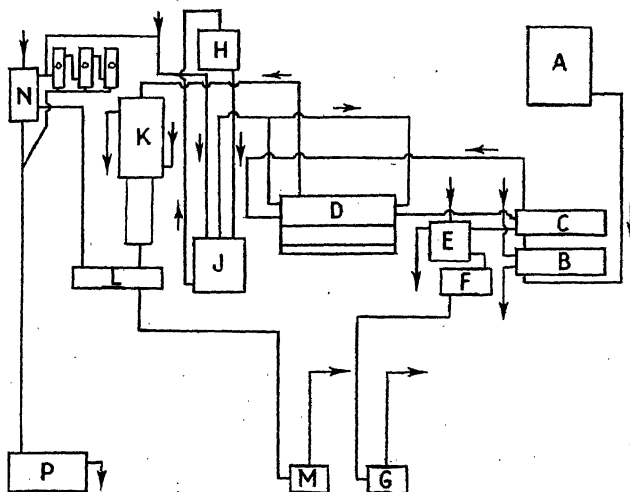
Heller bases this idea on the fact that the effect of steam on the hot oil can be made to accomplish not only the distillation of the fatty acids, but also a partial splitting of the glycerides and esterification, both with the free fatty acids themselves and with the coconut oil added.

If coconut oil is added to another oil containing free fatty acids and the mixture is treated by the Heller method, an esterification process occurs, in which, for example, groundnut oil fatty acids take up glycerine from the coconut oil to form new glycerides. A corresponding amount of coconut oil fatty acids—which are more easily volatilised—are set free and distil over.

Investigations in this field have shown that by the addition of coconut oil the expulsion of fatty acids from other oils, whose fatty acids are less volatile, is considerably facilitated. For example, 150 grams of groundnut oil, having a free fatty acid content of 3.35 per cent, have been treated for a period of 40 minutes, using 120 gr. of steam and a temperature between 287° and 315°C, at normal pressure. The treated oil still contained 2 per cent of f.f.a. This experiment was then repeated, but this time

Fig. 2

The Bamag-Wecker's process in diagram: A Crude oil storage tank; B Preheater, C Heat exchanger; D Reaction vessel; E Cooler; F Neutral oil collecting vessel; G Neutral oil pump; H Feed water tank; J Evaporator; K Fatty acid cooler; L Fatty acid collecting vessel; M Fatty acid pump; N Barometric condenser; O Vacuum steam jets; P Cooling water sump



with the addition of 5 gr. of coconut oil, and the final f.f.a. in this case was reduced to 0.4 per cent.

Such experiments make it obvious that the deacidification with coconut oil proceeds much more quickly by the distillation technique, and is more complete than with oils containing a major portion of acids of high molecular weight, such as stearic, oleic, etc.

It is claimed that at the relatively high temperatures employed in such tests that some of the acids of the coconut oil displace some of the acids of lower molecular weight; thus is obtained a nearly neutral oil without the necessity of volatilising the higher fatty acids.

The validity of this claim is strengthened by the fact that groundnut oil to which 3 per cent coconut oil has been added can be deacidified to 0.4 per cent f.f.a. without the use of vacuum.

In large-scale operation the Heller plant uses coconut oil to increase the volatility of the fatty acids and avoid the necessity for a very high vacuum. The plant used may consist of a reaction vessel of aluminium alloy, through which oil is continuously drawn by means of the vacuum pump. Within the vessel the oil is atomised and then brought into contact with a counter-

current of superheated steam. It is exposed to the high temperature only for a relatively short time.

In the early days of deacidifying oils by the distillation process, the fatty acids obtained were often of a dark colour and were contaminated, but these difficulties have been gradually overcome by carefully cleansing the oil before distilling. The effect of distilling uncleaned crude oil is to produce dark-coloured fatty acids of poor stability.

With modern continuous methods of distillation, wherein the oil is exposed to a high temperature only for a very short time, the proportion of neutral oil split is very small. On the contrary, whenever the oil is exposed at high temperature for an unduly prolonged period, with the object of rendering the oil entirely neutral, it is highly probable that an appreciable splitting of the neutral oil will occur, resulting in the formation of fresh quantities of fatty acids.

In brief, the distillation processes make possible the economic refining of oils which previously could not be handled economically, while such processes also provide fatty acids which have a wide sphere of application because of their high degree of purity.

Use of Conductive Rubber in Electrical Heat Exchange

THE possibility of a still wider commercial use of specially compounded rubber as a heat-distributing element appears likely to result from the production of conductive rubber in sheet form, which becomes a heating element simply by attaching a suitable electrical connection.

By enclosing the special material with normal insulating rubber and vulcanising the lead-in into the heater, a firm mechanical anchorage as well as a waterproof seal is secured.

Laboratory Use

Outlining suggested commercial applications, the British Rubber Development Board points out the advantages to research chemists of the use of these rubber panels as a means of heating awkwardly shaped glass instruments and connecting pipes.

The use of the material in this form also ensures the provision of steady heat for incubators and processes where strict heat control is required. In addition, low boiling and inflammable liquids can be handled with considerably increased safety and control.

One of the manufacturers of conductive rubber in sheet form, the Goodyear Tyre

and Rubber Company (U.S.A.) has concentrated particularly upon the application of this material, marketed under the trade-name Pliotherm, to the building industry, where it is utilised for supplementary heating of recreation rooms, garages, bathrooms, laundries, and nurseries. Other test installations have been made in small workshops where initial costs of heating installations are of prime importance, and in buses, rail coaches and aircraft.

The resistivity of Pliotherm (1 to 2 ohms-cm.) permits heating elements of practical size to operate on commercial power units from 24 to 220 volts.

Another producer of conductive rubber is the United States Rubber Company, whose Uskon ceiling-panels are being adopted by the U.S. building trade for house-heating.

The panel is constructed of a layer of the special rubber, sandwiched between layers of insulation material. The conductive rubber acts as an electrical resistance element, becoming warm when the current passes through. A layer of asbestos board strengthens the panel and aluminium foil is used as a reflector to prevent heat from going through the ceiling.

DEPRECIATION AND MAINTENANCE—I

Computation and Accounting for Chemical Plant

By S. HOWARD WITHEY, F. Comm. A.

CAREFUL and systematic control in the stages of production is now regarded as essential to ensure reliable and efficient behaviour of units and sections of chemical plant, and there is every indication that the production of acid is being materially increased by the use of the right type of equipment. Reports received from some chemical manufacturers and engineers, however, show that the problem of plant depreciation is still being deferred, with the result that the values placed on certain assets bear little relation to the amount of unrecovered investment in respect of which the users will expect to be reimbursed.

British chemical plant designed to meet special requirements and backed by many years of experience has a world-wide reputation for quality and reliability. It is being used for an infinite variety of work, and, as the result of progressive design, industrial components and specialities now embody highly skilled workmanship. It is recognised that productive efficiency depends largely on the degree of co-operation existing between makers and users and that production costs are adversely affected if plant which is smooth and positive in action is not operated on expert advice.

Many units and sections of chemical plant are now exceptionally dependable and eminently suitable for specific purposes, but unless there is a well organised spares and maintenance service the best results may be very difficult to achieve. Fortunately, the majority of suppliers are able to pursue a policy of steady progressiveness in the matter of maintenance, often in conjunction with a rigid inspection, and at the same time engineers are continually designing equipment calculated to reduce production costs, and new and improved methods of handling are constantly being devised.

Plant Replacement

In normal times, users of chemical and engineering plant and industrial equipment were able to make provision on a fairly generous scale for the inevitable decline in the capital value of the various groups and sections employed in production. Even under the changed conditions many companies still reserve a portion of their disposable balances for the replacement of plant, but some firms have now reached the stage where the existing equipment cannot be efficiently employed and the general position is rendered more difficult by the

steep rise in replacement costs and the inadequacy of taxation reliefs.

The amount of capital invested in mixers and acid-resisting plant, furnaces and tanks, distillation and evaporating plant, etc., is, of course, very substantial, and in deciding the precise rates at which book values should be reduced, and in the allocation of cost, a degree of specialised knowledge is demanded. Some very conflicting views are held by engineers and executives as to the most appropriate methods of computation and accounting, and the losses that arise from depreciation are not subjected to anything approaching scientific treatment.

The cost of replacement of fixed assets has increased enormously and unless adequate provision is made for future requirements out of current profits a serious position is likely to arise.

Assessing Depreciation

There are several methods of computing and recording the debit under the heading of depreciation. An equal proportion of the first or original capital cost of acquiring and installing chemical plant may be written off at the end of each year, including any transport or foundation expenses, the amount being charged in such a way that at the termination of a definite period the value of the plant as shown in the books will be a purely nominal figure. This method is usually adopted when the cost of maintenance and upkeep of the equipment is not expected to fluctuate materially as between one manufacturing or operating period and another, and may be applied to plant which is fabricated in materials which resist acids and alkalis or which are highly resistant to fused metals, oxides and molten glasses.

As a rule, the highest value that can be placed on acid-resisting plant and accessories consists of the original invoiced cost, while the lowest value is the value of the parts and material; consequently, in practice, the computation of the annual charge for depreciation is frequently based on the difference between these two extreme figures, having regard to the conditions under which the plant is to be operated. The practical application of this "straightline" method can best be indicated by citing an actual case.

At December 31, 1946, the evaporators, fans, pumps, elevators, piping, valves and fittings, etc., employed by a firm of chemical manufacturers in the Midlands had a

book value of £9000, and at a conference it was agreed that in five years' time this equipment would be worth no more than £3000. Early in 1947, additional evaporators, driers, and units of high temperature heating plant were acquired and installed at a total cost of £6000, including the transport charges, and it was decided that the annual cost of repairs and maintenance would be fairly uniform each year, and that at the end of ten years these capital additions would possess a realisable value of something like £2500. The amount to be charged each year for depreciation was arrived at as follows:—

One-fifth of £6000 (<i>viz</i> : £9000 less £3000)	1200
One-tenth of £3000 (<i>viz</i> : £6000 less £2500)	350

Depreciation £1550

At each annual balancing, the sum of £1550 will be recorded on the credit side of the acid-resisting plant account and transferred to the debit side of depreciation account. At the end of six years the asset account will show the details set out in the table reproduced below.

Although the computations are sometimes a little complicated by reason of wide variations in the effective service life of

capital additions, the nature of such annual losses does not change and instead of providing for decreases in capital value in a variable or casual manner the amounts to be written off should be determined in accordance with definite principles and treated as costs to be allowed for in prices.

Such assets as calorifiers, screens, acid valves, and units of impregnating plant are sometimes scrapped long before they have lost their market value. The proper lubrication of moving parts and a careful avoidance of overloading are the means whereby certain sections of chemical equipment can be employed over an extended period and in many works and factories at the present time the continuity of productive operations depends very largely on the nature and variety of the facilities and appliances which are available for carrying out repairs and overhauls, also on the quantity and suitability of the spare parts and attachments carried.

It is equally true that the adequacy of existing plant and accessories is often a vital factor to be taken into consideration in determining the precise charge to be made against contracts.

When maintenance costs seem likely to expand with the gradual decline in the capital value of plant, it is usually advisable to apply the "percentage" method of com-

ACID-RESISTING PLANT

Debit			£
1947			
Jan.	To Balance brought down	...	9,000
"	" Additions	...	6,000
			<u>£15,000</u>
1948			
Jan.	" Balance brought down	...	13,450
			<u>£13,450</u>
1949			
Jan.	" Balance brought down	...	11,900
			<u>£11,900</u>
1950			
Jan.	" Balance brought down	...	10,350
			<u>£10,350</u>
1951			
Jan.	" Balance brought down	...	8,800
			<u>£8,800</u>
1952			
Jan.	" Balance brought down	...	7,250
			<u>£7,250</u>
1953			
Jan.	" Balance brought down	...	5,700

			Credit	£
1947				
Dec.	By Depreciation written off	...	1,550	
"	" Balance carried down	...	13,450	
			<u>£15,000</u>	
1948				
Dec.	By Depreciation written off	...	1,550	
"	" Balance carried down	...	11,900	
			<u>£13,450</u>	
1949				
Dec.	By Depreciation written off	...	1,550	
"	" Balance carried down	...	10,350	
			<u>£11,900</u>	
1950				
Dec.	By Depreciation written off	...	1,550	
"	" Balance carried down	...	8,800	
			<u>£10,350</u>	
1951				
Dec.	By Depreciation written off	...	1,550	
"	" Balance carried down	...	7,250	
			<u>£8,800</u>	
1952				
Dec.	" Depreciation written off	...	1,550	
"	" Balance carried down	...	5,700	
			<u>£7,250</u>	

puting depreciation, the book value of the profit-earning equipment being subjected to annual percentage deductions from the diminishing value. The progressive decline in the charge for depreciation would then provide the margin required to meet the growing upkeep costs. But in those cases where interest on capital is one of the prime factors it becomes advisable to make provision for this by adopting the "annuity" method whereby the opening balance of the plant account is increased each year by the addition of interest at a fixed rate, and the total burden spread over a definite period in the form of equal annual instalments. Units or groups of chemical plant which are difficult to assess by the above methods may be subjected to periodical revaluations on the part of an expert, the decline in capital value being charged direct against the current operations in one amount.

The cost of maintaining some machines varies enormously as between one working period and another. Material fluctuations in the amount of the annual charge for upkeep and repairs can be avoided, however, by carefully estimating the maintenance costs over a number of years and by allocating an equal proportion against each year's operations. The figure of total cost plus the first or original capital cost of the plant would give the amount to be spread over a given period, and if this figure is divided by the number of years during which the equipment is expected to remain in commission, a fixed amount can be included in the costs and contracts which the actual expenditure incurred in repairs and renewals is debited against a reserve.

Allocations from Profits

This reserve would have to be fed from time to time by means of appropriations from disposable profits, and care would have to be exercised to distinguish between the many daily repairs and adjustments of a relatively trivial nature and the larger maintenance jobs, for while minor repairs can usually be charged against standing orders, the cost of the longer and bigger maintenance jobs may have to be incorporated in specific costings.

Sums expended on the renewal of tubing, caps, cocks and valves, filters, etc., are sometimes posted direct from the cash book to the debit side of a general repairs and renewals account kept in the nominal or expenses ledger. When this is the case, it should not be forgotten that if the book value of any displaced equipment has been written off and charged against the productive operations, the full cost of replacement should be debited to the appropriate asset account kept in the private ledger. This can be done as a direct posting from the

cash payments book or by dissecting the amounts recorded in the "capital outlay" column of the purchases journal, or bought day book.

Classifying Expenditure

Experience shows that items to be capitalised can be readily collected in the form of monthly or other period totals for ledger posting purposes by using a pattern of purchases journal which has been provided by the printers with a sufficient number of separate columns or sections for the systematic classification of capital expenditure. In addition to these records, however, an inventory of the entire productive plant and equipment should be maintained, this being preferably divided into sections to correspond with the varying types, specifications and capacities.

Each entry made in the inventory should give the date shown on the respective invoice or other debiting document, the name of the manufacturer or supplier, and a sufficiently detailed description to enable the equipment to be readily identified. Such information is of very considerable value to the management and staff, and will greatly facilitate matters at audit time and when drafting a balance sheet exhibiting a true and correct view of the financial position.

(To be continued)

"Home-Made" Carbon Black

£1 M. Project at Bristol

THE erection of a £1 million factory for the production of carbon black is expected to begin this year at Avonmouth, Bristol.

The factory will be built on a 20-acre site for the Palatine Development Company, which is jointly owned by Gas Consolidation, Ltd., and Severn Gas Corporation.

Earlier reports, emanating from Merseyside, suggested that a site on the Kirby trading estate, near Liverpool, would probably be chosen by the company for Britain's first carbon black plant (THE CHEMICAL AGE, July 24), although it was pointed out that other development areas were in keen competition with Liverpool to secure the enterprise.

The Palatine Development Company has obtained from the Phillips Petroleum Company, of Oklahoma, the rights to manufacture two types of carbon black in this country.

American technicians have already visited Bristol to discuss construction of the plant and Government sanction has been given to the scheme.

U.S. WORK ON SYNTHETIC FUELS

Minimising Poison and Explosion Risks

TWO German processes for converting coal to oil are now being studied at the new \$3.5 million synthetic liquid fuels laboratories and pilot plants of the U.S. Bureau of Mines, Bruceton, Pennsylvania.

The processes concerned are the gas synthesis or indirect Fischer-Tropsch process, and the direct hydrogenation of coal or Bergius process. These methods, adapted by the Bureau, are complementary rather than competitive processes and, although coal is employed as the raw material in both, the liquid products, resulting from the two systems, vary from heavy fuels to aviation gasoline.

The laboratories are provided with essential facilities for analytical work, engineering design and construction, and the major installations consist of gas-synthesis and coal-hydrogenation buildings, an administration department, a gas plant, and a boiler plant.

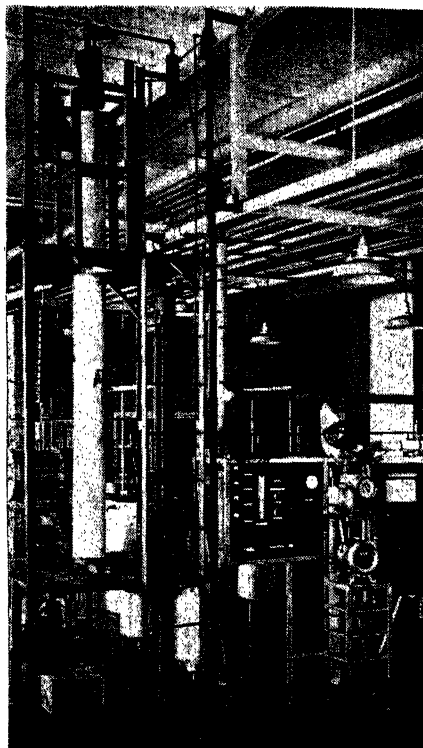
Gas Synthesis Tests

Coal received at the boiler plant is divided into two categories, one destined for steam purposes and the other for processing into liquid fuels. Methods to increase the variety of coal for synthetic fuel production are being investigated.

At the gas-synthesis building facilities are available for simultaneous tests on many phases of the Fischer-Tropsch process, adapted for the production of either a good grade of motor fuel or diesel fuel. As gases employed in the process are both poisonous and explosive, the building has facilities for gas detection and for increasing ventilation rapidly. Electrically operated windows can be opened simultaneously at the push of a button, and large fans quickly extract escaping gases from process buildings. Waste gases from experimental operations are piped to a special flare stack nearby and burned or vented.

A barrel-a-day pilot plant now under construction employs a new internal-cooling principle developed by the bureau to solve the major engineering problem involved in the process, namely, efficient removal of heat liberated during synthesis. Involving circulation of a cooling oil through the catalyst bed, this system permits enlargement of the converter unit to 500 or more barrels daily, as compared with a capacity of 18 barrels a day for converters used in German plants.

Investigations of the Bergius process are conducted in a three-storey building equipped with elaborate safety devices. An



The principal feature of the gas synthesis equipment at Bruceton is this liquid phase pilot plant on the Fischer-Tropsch principles

“explosion-proof” pilot plant area has been created by installing a thick steel and reinforced concrete wall to the roof line. The instrument room is behind the wall and kept under positive pressure to prevent any toxic or explosive gases from seeping through and endangering the operators.

An armoured room in this building houses high-pressure autoclaves used to test new developments before they are applied in the continuous pilot plants. In addition, laboratories are provided for research on process chemical engineering, batch hydrogenation, and control instruments. In these laboratories, a basically new and cheaper coal-to-gasoline hydrogenation process is being sought and several promising developments are expected.

CHEMICAL EXPLOSION HAZARDS

A Warning and a Reassurance from the U.S.A.

A WARNING of the possibility of explosion associated with one low-temperature treatment of aluminium chloride-nitromethane catalyst complex has been issued by two members of the American Cyanamid Company, Messrs. Frank M. Cowen and Ole Rørsø. The warning, which has been given prominence by the U.S. *Chemical and Engineering News* (August 2, 1948), states that "The catalyst complex was prepared in a manner similar to that used by Schmerling¹ and charged into a steel autoclave with other organic components. The autoclave was closed, cooled to 0° C., placed in a rocker, and shaken, while a gaseous olefinic compound was introduced to a pressure of 90 p.s.i."

When the valve was closed, no pressure-drop was noted, even when the temperature had risen to 10° C. The autoclave was removed from the rocker, again cooled to 0° C., and the procedure repeated. Since no absorption of olefin was noted, the autoclave was allowed to come to room temperature (26° C.), when the pressure dropped to 0 p.s.i. At this point it was left in the rocker overnight.

The next morning the autoclave and rocker were cooled to 2° C., olefin admitted to 85 p.s.i., and the valve closed. When the temperature had risen to 10° C., the autoclave was removed from the rocker and placed in a dry-ice chest.

"In about 3 to 5 minutes an explosion occurred, lifting the heavy lid of the chest several inches. Considerable quantities of soot filled the chest and the air of the surrounding area, and an odour similar to that produced by the combustion of nitrocellulose was evident.

"An inspection of the autoclave revealed that the rupture disk was broken and that all threaded connections were loosened. The interior was filled with a black, carbonaceous material. Inspection of the autoclave proper indicated that no extreme temperatures had been reached.

"Since this particular type of reaction had been run several times at temperatures as high as 40° C., the result was entirely unexpected, especially in view of the low temperatures under which this particular experiment was conducted. It has been reported² that mixtures of ethylene, aluminium chloride, and nitromethane have exploded, but the reported explosion occurred at 75° C.

"In view of the difficulties that would be encountered in assessing the exact nature of the explosion, it seemed best to warn other workers who may be experimenting with similar reactions. Information on any similar experiences will be appreciated."

¹Schmerling, Abstr. N.Y. ACS Meeting 4N, Sept. 1947.
²H. I. Waterman, W. J. Hessels, and J. v. Stevins. *J. Inst. Pet.*, 33, 254-5 (1947).

AMMONIUM NITRATE "NOT AN EXPLOSIVE"

A REASSURING view of the fire or explosive hazards associated with ammonium nitrate is taken in the annual (1947) report of the U.S. Bureau of Explosives. It mentions also that the year was the 26th in which no death or injury had resulted from mishap in the transportation by rail of commercial explosives.

Of ammonium nitrate, the bureau records that it was called upon to conduct experimental work with the fertiliser grade of the chemical. That which caused such catastrophic destruction at Texas City in 1947 was not being transported by rail and part of the investigation conducted by the bureau was to determine whether the material can explode under conditions associated with rail transportation.

While fires have been reported in rail shipments, and all reported fires have been

investigated by inspectors of the bureau, it was reported that fires were caused by sparks or flame from an external source, and in no case had any explosion resulted from such fires nor had tests indicated that explosions will occur under these conditions.

The classification of ammonium nitrate fertiliser as an oxidising material was accurate, and provided reasonable precautions were taken in transportation to avoid ignition of the outside containers, fires should not occur.

During the year 302 amendments to the regulations for the transportation of explosives and other dangerous articles were approved and published by the Interstate Commerce Commissions, many of them were necessitated by the continuance of emergency conditions or the development of new chemicals which are properly classed as dangerous.

American Chemical Notebook

From Our New York Correspondent

DR. William J. Youden, prominent mathematical statistician and chemist, has been appointed to the staff of the U.S. National Bureau of Standards as assistant chief of the statistical engineering section. For many years Dr. Youden was with the Boyce Thompson Institute for Plant Research, where he developed a type of experimental design called Youden Squares. These squares, which are especially valuable in agricultural and animal experimentation, specify certain groupings of the items under comparison so that a fair test of every item is ensured. At the bureau, Dr. Youden will work on the statistical and mathematical design of major experiments in physics, chemistry, and engineering and will act as special adviser on these problems to the director.

* * *

Further fields of application for X-ray diffraction in the identification and quantitative analysis of unknown materials have been opened by a new high-precision, high-output machine, details of which have recently been released by General Electric X-Ray Corporation, Milwaukee, Wisconsin. One attachment, the fluorescent analyser, is claimed greatly to extend the range of materials which can be analysed, as compared with the analytical scope of optical spectrometers. Other instruments make possible the direct recording of X-ray intensities on a continuous strip of chart paper, thus saving hours of laboratory time by revealing both the angular position of the characteristic lines of materials and their relative intensities.

* * *

A new pilot plant, designed to produce liquid hydrocarbons from natural gas by an electro-chemical process, has just been completed at Mt. Carmel, Illinois, by the Electronic Chemical Corporation whose director of research, Dr. Henry M. Unschuld, declares that the liquid hydrocarbons produced from methane are 99 per cent pure. These hydrocarbons are used as bases for the production of high octane gasolines, acetone, freon, ethyl alcohol, formaldehyde, etc. Dr. Unschuld says that this method is capable of producing four gallons of liquid hydrocarbons from 1000 cu. ft. of methane gas.

* * *

The half yearly report of Aluminum, Ltd., states that engineering and construction staffs supplied by its Canadian subsidiary, will shortly leave Canada to start work on the erection of a bauxite crushing and drying plant, with anchorage and shiploading

facilities, in the Los Islands, 500 miles south east of Dakar. Development of the bauxite deposits on these islands is expected to produce 250,000 tons of bauxite a year for the company's Canadian aluminium smelters at Arvida, Quebec, thus supplementing supplies received from British Guiana. The report states that the company's net earnings for the first six months of 1948 totalled \$13.25 million, after deduction of all charges and taxes. This compares with \$8.7 million during the same period last year.

* * *

An improved catalyst for the conversion of carbon monoxide to carbon dioxide and hydrogen, known as Enjay BR-769 Conversion Catalyst, is now being marketed by Enjay Company, Inc., an associate of Esso Standard Oil Company. The new product is an iron-chromium converter catalyst having a side strength of 50 to 70 lb. and a bulk density ranging from 80 to 100 lb. Normally available in $\frac{1}{8}$ in. pellets, it can be obtained in pellet sizes ranging from $\frac{3}{16}$ in. to $\frac{1}{2}$ in.

* * *

Processed Chemical and Coatings Corporation, Brooklyn, New York, recently announced the development of a new non-staining insecticide claimed to be much more effective than DDT against a wide variety of plant and animal pests. Known as CD-68, the new chemical compound contains technical chlordane, and is said to be less toxic to humans and animals than DDT. Officials of the firm say that a spray application of CD-68 will remain insecticidally potent for five weeks to two months after treatment.

New Steel Process

TWO Canadian metallurgists, F. G. Kerry, of Montreal, and E. T. W. Bailey, of Hamilton, Ontario, have just patented a new process enabling faster steel production in open-hearth furnaces achieved by making initial temperatures much higher through increased use of oxygen. The time required for melting the charge of scrap in the furnace is shortened by blowing in a gas containing 60 per cent oxygen—three times the oxygen content of the air normally used—and increasing the gas or atomised oil fuel by at least 15 per cent. After the charge has been melted, a lower-oxygen blast will suffice, and ordinary air is substituted for the initial injection.

Technical Publications

A CATALOGUE capable of affording more than usual interest and assistance to the chemical and process industries has been issued by A. Boake Roberts & Co., Ltd., London. It contains a comprehensive price list of all the basic chemicals manufactured by the firm, and specifications, descriptions and suggested uses. It is pointed out that although all the products normally made by the company have been included in the catalogue, certain items are not at present in commercial production, but information on availability will be supplied upon request. Provision is made for the subsequent inclusion of pages relating to new products by publishing the booklet in loose-leaf form.

* * *

"Organic Acids" is the title of a new booklet issued last week by the (U.S.) Carbide & Carbon Chemicals Corporation. The new publication presents in detail the properties, specifications, test methods, and uses of synthetic butyric acid, 2-ethylbutyric acid, caproic acid, 2-ethylhexoic acid, and sorbic acid. These acids are important as intermediates in the production of synthetic flavours, plasticisers, varnish driers, and pharmaceuticals. Thirteen charts in the new booklet present such data as physical constants, solubilities, and electrical conductivity. Constant boiling mixtures and a section on specification test methods are also included. Copies of the booklet, Form 4768-A, may be obtained from the corporation, 30 East 42nd Street, New York 17, N.Y.

* * *

P. R. Mallory & Co., Inc., 3029 E. Washington Street, Indianapolis, Ind., has published a new technical information bulletin on spot welding of aluminium alloys. The 14 chapters, illustrated with diagrams, photographs and specification charts, cover all phases of this branch of welding—surface preparation, equipment, techniques and testing of spot welds, and a wealth of other material, including a very complete bibliography.

* * *

Details issued this week by the Metropolitan-Vickers Electrical Co., Ltd., of a new infra-red drying plant indicate that with this small gloss painted articles can be completely dried in five minutes, employing temperatures in the 460°-530°F. range. Fitted with 216, 250-watt industrial infra-red lamps of an internal reflector type, this equipment dispenses with the external type



Interior of the infra-red drying chamber
(Courtesy of Thomas Crompton & Sons, Ltd.)

reflectors—and the necessity of cleaning them. Two vertical banks of lamps with a loading of 54 kW are employed.

* * *

A. C. Wickman, Ltd., has issued its own 48-page guide to the Machine Tool and Engineering Exhibition (Olympia, August 24 to September 11). Printed in colour, it provides a comprehensive list of the exhibits on the Wickman stands. A picture of each exhibit is flanked by a description in four languages, French, German, Spanish and English.

* * *

The use of carbon collectors, as an efficient and economical means of collecting current for cranes and for trolley booms of industrial travelling equipment, is the subject of an illustrated folder obtainable from the Morgan Crucible Co., Ltd., S.W.11.

New Coalfield.—Geological investigations carried out in Czechoslovakia are stated to have revealed a coalfield extending over nearly 100 square miles near Lucenec in Slovakia.

FILTRATION BY SINTERED GLASS

Manufacturers' Review of New Possibilities

SO rapidly has become familiar the use of sintered glass in science and industry that its comparative novelty is prone to be overlooked. Prior to the war, production of sintered glass was almost entirely a German activity and its uses were correspondingly restricted. War, by making essential large-scale production here of sintered glass, has enabled science and industry to use it much more freely, with marked benefits in the scope and efficiency of both.

Early Uses

A brief history of glass sintering and a summary of the characteristics and widening uses of the material form part of the latest publication by Baird & Tatlock (London), Ltd.* This recalls that one of the first needs for sintered glass was to solve the problem of fusing metal to glass, a problem which became vital at the dawn of this electronic age, for electronic engineering involves the juncture of glass and metals in confined spaces and with perfect accuracy.

The leading-in wires, for example, of an electronic valve have to be manipulated in so confined a space that the low fluidity of molten glass makes it difficult, and sometimes impossible, to force a drop of glass between the metal parts.

In such a case finely powdered glass may be inserted and fused with heat. The operation can be performed in a way to secure a perfect seal, although the sintered glass will contain a large number of minute air bubbles.

There is another use for sintering which is quite different and depends upon the closely controllable porosity which can be given to a mass of sintered glass.

In the mineral which suggested the industrial application of the sintering process, there are present particles of various sizes and various chemical constituents. These particles, therefore, have various melting points, and the mass as a whole consists of a mixture of fused and unfused particles.

The result is that the mass has a varied and unpredictable degree of porosity. By powdering glass to a carefully graded particle size within very narrow tolerances, and by subjecting this homogeneous material to the proper degree of heat a filter

can be produced of known and accurate porosity.

Such a filter has great advantages over a filter paper. Whatever care is taken, it is virtually impossible to prevent fragments of the filter paper from passing into the filtrate; moreover, glass, being inorganic and unaffected by most acids, can be easily flamed and cleaned.

It need hardly be said that the creation of a wide range of crucibles, funnels, extractors, filters, using sintered glass is beset, with many technical difficulties and requires much experiment before methods can be perfected.

Baird and Tatlock were the chief firm to go thoroughly into the new technique and they are now able to produce discs in seven different ranges of porosity. That is to say, with pores whose capillarity lies within seven different ranges. The standard porosities each have their own practical use.

The coarsest standard consists of a disc with pore size of between 200 and 500 microns, and is suitable for a support for solids in gas or liquid reactions where it is necessary to impede the flow of gas or liquid as little as possible.

At the other end of the scale is "number 5 on 3 porosity." Here there is a layer of No. 5 in which the pore size varies between 0.7 and 3 microns and is supported by a layer with pore size between 15 and 40 microns; this filter is commonly used for bacteriological purposes.

Between these extremes there are porosities suitable for gas distributors with low pressures, for filtering off crystalline solids, for coarse to medium precipitates, for clarification of solutions to be used in injections or for fine filtration in analytical work, for the removal of sediment from strong acid or alkaline liquors, for use as non-return filters with mercury forming the closure for a number of other purposes.

For Pressure Filters

Among other types of filter that have already been proved to have extended usefulness, the pressure filter should be mentioned. Its use is indicated for filtering volatile liquids such as ether or the light petrols when they contain substances which will readily crystallise out. Pressure filters with sintered glass can be used for air-pressure lines, small hand pumps or *via* a governor from a cylinder of inert gas. They can be surrounded by jackets to contain heating or cooling media. They are made with all-glass construction up to 1300 m.l. capacity

* "Measuring the Future," an illustrated review of wartime activities and technical advances now being applied in the production of scientific equipment, written by John Langdon-Davies and published by Baird & Tatlock (London), Ltd., 14-17 St. Cross Street, London, E.C.1.

and capable of withstanding one atmosphere of pressure.

Baird and Tatlock made great advances during the war in the design of filters for micro-chemical apparatus. Sintered glass discs with diameters of 10 m.m. are manufactured for this purpose, and the filter is designed to reduce the liquid capacity above the disc to the minimum in order to facilitate the drying of the filter.

New designs for centrifuge filters have been produced. In the earlier types, the granular carbon undergoing tests was supported on silver gauze which had to be attached to the glass by Canada balsam or gum arabic. The advantage of a sintered glass disc over such a construction will be immediately obvious. By using the coarsest discs, impedance to the gas flow became negligible and by making the tubes themselves of precision bore glass tubing it was possible to secure the complete uniformity of the column under test.

Gas-Washing

Another great improvement was in apparatus for gas-washing, particularly perhaps for the removal of fog or smoke from gases. Earlier forms of apparatus depended for their effect upon imparting a high velocity to the gas and by then imposing on it a sudden change of direction, in the course of which the tarry and other particles in the gas flow were thrown against the walls and adhered there.

By using a sintered glass disc, the need for such a method, involving, as it did, complicated and tough glass bending is removed, since the channels within the sintered material are themselves tortuous with many

changes in direction and therefore capable of producing the same effect.

Another problem which was somewhat unexpectedly solved by the introduction of sintered glass was the problem of heating water and aqueous solutions in all-gas apparatus by the blowing in of live steam silently. Steam blown into water through a sintered glass thimble or disc creates no audible sound at all.

Hitherto a metal tube or drum pierced with a large number of small holes had to be used to break up the steam as silently as possible. Apart from the fact that the introduction of metal brought with it a new set of problems, no mechanical piercing could possibly produce such a number of very fine channels as are provided by the capillary pores of the sintered glass.

At low temperatures indeed the condensation of the steam may take place within the sinter. Bubbles are only noted within the higher range of temperature where they collapse without noise.

Thus, sintered glass has had a very short but varied English history. We have had to create the practical experiences of a generation in a few short years, but we can say without hesitation that we already possess a greater accumulation of proved data about the possibilities of sintered glass than the Continental countries were able to gain during their long period of experimentation.

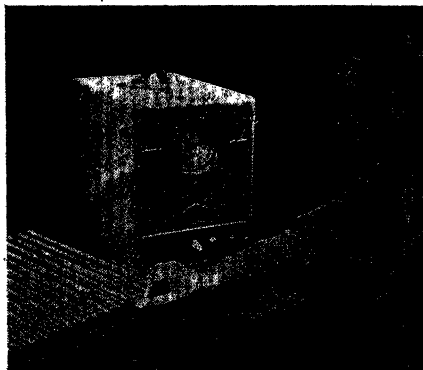
Sintered glass can be taken as a type, in a small scale, of the sort of industry which is socially desirable because it requires no importation of raw material and cuts out not only the need to import finished articles from Germany but also to a certain extent Swedish filter paper.

Portable Reflectoscope

THE production of a new supersonic reflectoscope, type SR05, used for the non-destructive testing of metals and other materials both for internal defects and for welds, was announced recently by Sperry Products, Inc., Hoboken, New Jersey.

The specifications of the new instrument are similar to those of the firm's previous model but a reduction in size and weight has been made by eliminating waste-air space and re-designing the circuits. Measuring 14 in. by 16 in. by 23 in. and weighing 85 lb. the apparatus is transported by means of handles on the case.

While sensitivity of the instrument remains the same, operation has been simplified by reducing the number of external controls to five, governing the variation of sensitivity, pulse width, sweep length, screen markers, and frequency.



The new instrument in use

Spanish Plans to Raise Nitrogen Production Dependent on More Plant and Electric Power

LIKE most European countries, Spain has an acute need of more artificial fertilisers and an urgent desire to supply it without greatly enlarging her dependence upon other nations.

This has been the central theme of discussion in the Spanish journals *DYNA* and *ION*. The former, reporting the recent engineering congress in Barcelona, reproduces the forecast made by the Minister of Industry and Commerce (Señor J. Antonio Suanez) that electric power, and especially hydro-electric sources, would be very greatly developed in the future. That would permit very large extension of production of fertilisers, especially of nitrogen.

Heavy Price Increase

Further details of the nitrogen position are given in *ION* for June and July, 1948, in response to an editorial questionnaire on the subject which elicited replies from leading firms engaged in manufacture or distribution, relating to import difficulties, national consumption, home production, and prospects of further extension in Spain.

The Director of *Energia e Industrias Aragonesas, S.A.* (A. S. Peralva Alvarez) says that prior to 1936 there was considerable dumping of foreign fertilisers at prices lower than those ruling in the producing countries. In 1932, for example, prices were 20 pesetas per 100 kg., sometimes including packing and delivery. Present prices are in the region of 200 pesetas, and the sacks alone are each worth about 20 pesetas.

Consumption of nitrogenous fertilisers in 1936 was about 700,000 tons, imports costing some 65 million gold pesetas. Home production of ammonium sulphate was 17,267 tons in 1945 and 15,721 tons in 1946. Home demand in the near future was likely to be at least 900,000 tons, with increasing appreciation by Spanish farmers of the value of these fertilisers.

It was urgently necessary to stimulate national production, in view of world conditions, including some political antagonism towards Spain, which was supposed to have induced the Combined Food Board to restrict supplies to Spain.

Among the leading manufacturers in Spain, in addition to *Energia e Industrias Aragonesas*, are the *Soc. Iberica del Nitrogeno*, the *Soc. Española de Fabricaciones Nitrogenadas*, *Nitratos de Castilla*, and *Hidro-Nitro Española, S.A.* Some of these are undertaking extensions, but progress has been slow because of supply difficulties.

The *Soc. Española de Fabricaciones (Sefanitro)* has apparently been able to import only a small part of the plant required, and has had to develop a hydro-electric scheme for its power requirements. It hopes ultimately to have a nitrogen fixation plant of 25,000 tons capacity (125,000 tons ammonium sulphate) but this may take some years to achieve.

The *Soc. Iber. del Nitro*, appears to have had somewhat better success, and will probably be in a position this year to supply at least 20,000 tons of ammonium sulphate, with progressive increases in subsequent years. The target of *Nitratos de Castilla* is somewhat larger but a little more remote, namely, 10,000 tons of nitrogen (50,000 tons of ammonium sulphate).

Energia e Industrias Aragonesas is awaiting completion of water-power schemes in the Upper Pyrenees of Aragon before it can realise its plans for production of 4000 tons nitrogen annually.

Andrés Garrido, of *Abonos Medem*, representing the distributive organisations, gives the ultimate output of *SEFANITRO*, associated with *Altos Hornos de Vizcaya*, as 200,000 tons of ammonium sulphate; and a total output of 100,000 tons of nitrates for *NICAS* and *Hidro-Nitro* in the Aragon Pyrenees. He thinks that when these are working to full capacity about 60 per cent of total home agricultural demand will be provided for. He refers also to the Sagunto scheme, in which hydrogen or water gas from the coke ovens and lignites and low-grade coals would be used for the production of another 200,000 tons of nitrogenous fertiliser.

Opposed to Nationalisation

On the question of nationalising the fertiliser industry, Señor Garrido thinks this economically unsound, as costs would be greater than if production were left to private enterprise. Units of nitrogen would be more expensive to the Spanish farmers and market gardeners and would not be economic unless at least 2 million tons per annum of produce and fruit were exported.

On the question of protective tariffs and consequent higher prices, reference is made to the fact that Lord McGowan, on his recent visit to Spain, expressed sympathy with the ambitions of many countries to attain self-sufficiency, and his reminder that it might be better wisdom to allow free importation of certain materials in order that the general productive powers of the country should not be hampered or its export trade restricted.

FERTILISER "FAMINE" IN S.E. ASIA

Indian Plans to Produce Nitrogen and Phosphates

ONE of the more important causes of the slow progress of food production in many parts of India and the failure to expand it in others has been an extreme shortage of fertilisers, particularly nitrogen. It is pointed out in the report of the Provincial Industries Committee, Bombay, that Indian soils are particularly deficient in nitrogen and for the bulk of her requirements of nitrogenous fertilisers, India has to depend upon imports.

It is estimated that India's total requirements of nitrogen for all crops is 2 million tons per annum, contrasting with an allocation of 40,000 tons for 1948. At present there are only five net exporters of nitrates—Chile, Canada, the United Kingdom, Norway and Belgium. India has been able to secure only a small fraction of her chemical fertilisers from abroad.

The Indian agricultural departments have been working intensively for three years on a variety of projects for enlarging the yield of fertilisers from waste products of many kinds, but no adequate substitute for a full supply of artificial fertilisers is likely to be derived from the total yield of all these sources.

The nitrogen content of waste from oil pressing, for example, is very small, varying from 1.5 per cent to about 7 per cent. The total production of inedible oilcakes in India, used for manure, is about 250,000

tons. India's pre-war export of bones averaged 200,000 tons. These were crushed at the ports and shipped abroad. The quantity of ground bones exported has now been reduced to 40,000 tons per year, which involves a reduction in the quantity of bone meal available for manurial purposes.

India's principal needs are for ammonium sulphate for all crops, particularly rice, ammonium nitrate, sodium nitrate, calcium cyanide and potassium nitrate.

With the exception of potassium nitrate and to some extent ammonium sulphate, no artificial manure is manufactured in India. Ammonium sulphate is now available to the extent of some 45,000 tons a year from within the country. When the Sindri factory goes into operation the production will be about 420,000 tons per annum.

India's requirements for manuring 3 million to 5 million acres of cereals, particularly rice, are estimated at 100,000 to 150,000 tons a year. Superphosphate can be produced from bone as a by-product of the glue and gelatine industry. Without this industry the production of superphosphates alone from bones is expensive. Experts are now pressing the view that cheap superphosphates can be produced in India by utilising surplus sulphuric acid and importing ground rock phosphates from North Africa.

REDUCED CHEMICAL SHIPMENTS ENDANGER CEYLON'S INDUSTRIES

From Our Own Correspondent

INCREASING stringency of supplies of some essential chemical products is being experienced in Ceylon as a result of political and economic disturbances in areas upon which the island's industries have formerly depended. Fertilisers and materials for soap manufacture are two categories in which acute shortages are becoming manifest.

As a result of the disturbed conditions in Palestine, shipments of potash have for some time been suspended and no stocks of this fertiliser are available for tea and rubber estates in Ceylon. Dr. R. V. Norris, director of the Tea Research Institute and organiser of fertiliser rationing, has stated that potash will not, for the present, be included in the standard mixtures.

Intimation has been received that for the

year, July, 1948, to June, 1949, Ceylon has been allocated approximately 9370 tons of nitrogen, which represents only about 62 per cent of the quota applied for. For a period of some months after September shipments of ammonium sulphate from the United Kingdom are likely to be relatively small.

The Fertiliser Committee, has, therefore, revised the whole position and decided that in the circumstances it will now be impossible to deliver the arrears of manure due for the first and second quarters of 1948 in the case of old rubber estates and for the second quarter in the case of tea. Third and fourth quarter quotas of both tea and rubber fertiliser will be delivered and issues have, in fact, already commenced.

Allowing for stocks of nitrogen already

available and the new quota, allocated, it is expected that estates will receive the same nitrogen quota for 1949 as they were allotted for the present year.

Because they foresee an acute soap shortage in Ceylon, leading manufacturers of soap recently sent a deputation to the acting Controller of Imports and urged an immediate revision of duties on groundnut oil, palm oil and resin, and requested the Government to obtain regular quotas of caustic soda.

Local soap manufacturers are faced with the task of meeting the highest post-war demand for soap, consequent on a sharp drop in imports of toilet soap. Britain, which supplied the bulk of toilet and laundry soap, is stated to have reduced exports to the lowest level yet reached, and dollar exchange difficulties and prohibitive rates have rendered Canadian soap unavailable.

The acting Controller of Imports told the deputation that Australia, too, was not able to supply soap or tallow for soap. The alternative sources of supply are the U.S.A., the Argentine and Uruguay. The ruling market prices in these countries are not less than \$500 c.i.f. Ceylon—three times higher than the prices Australia charged in 1945-47.

The recent raising of the import duty on alternative materials, such as groundnut oil, palm oil and rosin, to 45 per cent more than the pre-budget cost, is adding to manufacturers' difficulties. The duty on groundnut oil is now Rs.45 per cwt.

Ceylon May Make DDT

The Government of Ceylon is to investigate the possibility of manufacturing DDT in Ceylon. Dr. S. Ganguly, Ceylon's quinine technologist, who returned to the island after a comprehensive tour of factories in the United Kingdom and Europe, said that he saw no reason why DDT could not be manufactured in Ceylon. There was, however, a shortage of the requisite raw materials required at present, he said.

Dr. Ganguly's visit to Europe was to ascertain how best the Ceylon Government factories can be expanded on economic lines. He visited various factories in Norway, Switzerland and the United Kingdom.

Referring to shark liver oil manufactured by the Ceylon Department of Industries, Dr. Ganguly said that it was equal in standard to the cod liver oil manufactured by most European countries. He urged that the rate of production should be increased.

ECA Oil Department.—The Economic Cooperation Administration has established a special department to deal with petroleum derivatives.

Empire Needs Fertilisers

Crop Increases Prevented

THE acute shortage of fertilisers was advanced, in two separate statements made last Monday, as one reason for the restricted output of Empire oranges and tobacco.

Mr. Ian Kerr-Cross, overseas manager of the South African Co-operative Citrus Exchange, speaking at a luncheon in London, said that their growers were doing everything possible to increase production to meet Britain's demand for more oranges. "Production could be increased by 20 per cent within one year if our growers could get their full fertiliser requirements."

Sir Alexander Maxwell, chairman of the Tobacco Advisory Committee, visiting London for talks with Board of Trade officials on tobacco supplies, said, in connection with Empire stocks, "We are getting 48 million lb. from Rhodesia and we take all India's surplus but world shortage of fertiliser stops the Empire from growing more."

Ceylon Copra Agreement

The Ministry of Food has announced that agreement has been reached between representatives of the Government and the Government of Ceylon for the purchase of copra and coco-nut oil from Ceylon. It supersedes the existing agreement covering the period July 1, 1943, to December 31, 1950, and provides that any quantity taken during the period July 1 to December 31, 1948, shall be at the price of £50 per ton of copra, f.o.b. Ceylon ports. The price for a minimum quantity of 40,000 tons of oil in 1949 is based on a price of £55 per ton of copra, f.o.b. Ceylon ports. The price for 1950 is to be agreed towards the end of 1949 in conjunction with negotiations for a long-term contract, possibly for five years to include the year 1950.

"Growth of Scottish Chemical Enterprises"

In the report from Scotland on the progress at Grangemouth in implementing the plans to produce chemicals from petroleum (THE CHEMICAL AGE, August 7) it was incorrectly stated that Imperial Chemical Industries, Ltd., was among the companies associated with the project. I.C.I.'s association with this branch of chemical production is, of course, centred in its own undertaking which is being laid down at Wilton, where later petroleum-based chemicals and other products will be produced on a large scale, in collaboration with the nearby Billingham division (THE CHEMICAL AGE, May 1).

Home News Items

Queue for Telephones.—On May 30 the number of outstanding applications for telephone service was 453,961 as compared with 449,466 outstanding at the end of April.

Laboratory Destroyed.—The laboratory at the Blackmoorfoot reservoir belonging to the Huddersfield Corporation Waterworks was destroyed by fire in the early hours of August 13. No other building was affected.

Instrument Manufacturers Extending.—The Ipswich Instrument Co., Ltd., of New Street, Ipswich, Suffolk, engaged in the production of equipment for chemical research, are carrying out building extensions which will enable an additional staff of 75 skilled craftsmen to be accommodated.

Retread Standards.—To advise on what standards ought to be laid down and maintained for retreading of tyres, a technical committee, under the chairmanship of Mr. R. H. Pike (Pike Tyre & Rubber Co., Ltd., Brixton) has been set up by the permanent conference of the Retread Manufacturers' Association.

Chemical Works Blaze.—An oil store containing 35,000 gals. of fuel oil was threatened by a fire which started in the quinine processing department at Howards & Sons, Ltd., chemical manufacturers, Ilford, last Monday. In successful efforts to prevent the blaze spreading to the store three firemen were injured. Production will be maintained in all departments, except the quinine section.

Penicillin for Veterinary Use.—Glaxo Laboratories, Ltd., Greenford, Middlesex, is now producing Penicillin Veterinary Cerate for the treatment of bovine mastitis. The cerate is supplied in boxes containing 16 tubes each holding a single dose of 100,000 international units of penicillin, presented in a non-irritant base of arachis oil with 4.5 per cent white beeswax to secure steady and prolonged action in the udder.

Destructive Fire at Bleachworks.—Fire severely damaged the two-storey Elton Vale Bleachworks of Joseph Parker & Sons, Ltd., Bury, last week. Smoke poured over the town as drums of petrol and chemicals exploded. Passers-by helped to remove the firm's documents and office furniture, and jets of water were directed on to the adjoining petrol stores by the Bury fire brigade. As a result of the outbreak, three-quarters of the 60 employees will be temporarily out of work. Half the two-storey buildings—the finishing room and packing room—were destroyed, but 200 rolls of cloth for export were salvaged.

Steel Strikers Return.—The 2000 strikers at the English Steel Corporation's works at Openshaw, Manchester, all returned to work last Monday after a week's absence.

Another Copenhagen Exhibitor.—Among the latest additions to the list of exhibitors at the British Exhibition at Copenhagen (September 18-October 3) is Chemo-Metals (London), Ltd.—exhibiting in the Gutenberghus.

Prices of Oils and Fats.—The Minister of Food, announces that no changes will be made in the prices of refined oils and imported edible animal fats allocated to primary wholesalers and large trade users during the eight-week period ending October 9, 1948.

The Topical Touch.—A works outing for employees of Thomas Hill Jones, Ltd., London, E.3, described as "A Nationalised Beanuerino to the Bevanised town of Southendski-on-Mudovitch" on August 14, was enlivened by a programme parodying Government directives and signed by "Chief Enforcement Officer, W. S. Lloyd Willey."

Fibro Project in Doubt.—Courtaulds, Ltd., has decided that the company considers it inadvisable to regard the establishment of a viscose staple yarn factory at Easthaven, near Carnoustie, as a definite commitment within the next few years. The company has notified the Dundee Corporation Water Committee that it does not wish to hear the cost of increasing the water services from the corporation reservoir at Lintrathen.

New Lubricants Plant.—C. C. Wakefield & Co. is to open a new refinery for lubricating oils at Ellesmere Port, and hopes to start production on a small scale in December. The plant had been under construction for 18 months, but, owing to the difficulty in the supply of materials, it may not be completed for another two years. The new plant is intended to take the place, on a larger scale, of the present one in Regent Street, Liverpool.

Sir S. Cripps Impressed.—"I was very struck by the employer-employee relationships at the factory, and the complete system of joint consultation which is common to all the Dunlop factories and which has proved of such great value to them," said Sir Stafford Cripps after spending 2½ hours recently at Dunlop Rubber Company's Speke factory. "I hope it will also prove of great value to many other industries which have not yet adopted that method, but will be doing so in the near future."

PERSONAL

MR. JOHN KEAY has been elected chairman of English China Clays in succession to MR. REGINALD MARTIN, who has resigned.

Multi-lingual (French, German, Italian) announcer at the Olympic cycling events at Herne Hill was MR. C. R. ST. QUINTIN, publicity manager of De La Rue Insulation, Ltd. He is a keen amateur cyclist.

Following the acquisition, by the Broken Hill Corporation, of a financial interest in the Sulphide Corporation, the directors of the latter have resigned and the following have been appointed their successors:—MESSRS. J. R. GOVETT (chairman), L. B. ROBINSON, D. P. C. NEAVE, F. A. CREW and G. R. FISHER.

MR. E. J. EVANS, power engineer at Lever Bros. (Port Sunlight), Ltd., since January, 1947, has been appointed chief engineer of the company, responsible for power, civil and mechanical engineering. MR. J. B. LANCASTER, his deputy since January this year, has been appointed power engineer.

Edgar Allen & Co., Ltd., announces the retirement of MR. P. S. AVIS, M.C., technical sales engineer of the engineering department. He joined the firm in March, 1919, on demobilisation from the Army, and has, for many years, been responsible for preparing estimates for engineering work.

MR. EDGAR DUCKWORTH, works director, and MR. STANLEY GUNN, sales director of the Leyland Paint and Varnish Co., Ltd., Leyland, are now on their way to South Africa to serve the Leyland Paint & Varnish, South Africa (Pty.), Ltd., which has been formed to operate a new factory to be started at Linkside, Mossel Bay. Building work on the factory will start next month. The plant will require two years to complete and will enable the company to develop existing trade in the whole of Africa and the Mediterranean area.

MR. REGINALD HEWITT, who has for 29 years been labour manager of The Clayton Auline Co., Ltd., has now been appointed the company's industrial relations officer to enable him to devote more time to the broader issues of labour policy, both national and international. He has had a lifelong experience of dealing with labour in all its aspects, and in recent years has represented the chemical industry at various inter-

national conferences—latterly as employers' chairman at the first meeting of the Chemical Industries Committee held at Paris in April and as one of eight advisers representing British employers at the ILO conference at San Francisco last month.

Obituary

SIR JAMES WALLACE PATON, pioneer Liverpool manufacturer, and founder of Paton Calvert and Co., Ltd., died last week at his home in Gloucester Road, Birkdale. In 1887 he patented a new type of cleaning powder and, without capital, started a business in the Liverpool area. His invention, intended for use on ships to clean paintwork, proved popular and the business expanded. Later he introduced a metal polish and one contract he received was for 50 tons for the Royal Navy, packed in 1,750,000 tins. To-day the factory premises of Paton, Calvert and Co., Ltd., at Old Swan, Liverpool, cover a great area.

DR. WILLIAM CULLEN, who died in Edinburgh on August 14, aged 81, was a chemist and mining engineer whose devoted service during the early part of his career contributed in a very large measure to the successful development of the Witwatersrand mines of South Africa, from the early days of the present century. He did much also to bring about the present stability of political and social affairs in S. Africa and its academic development. He learned his chemistry at the Andersonian College (now the Royal Technical College), Glasgow, studied mining at the Freiburg School of Mines and widened his knowledge of industrial chemistry with the original establishment of Alfred Nobel in Glasgow and later at Kynoch's. He went to S. Africa during the S. African war and devoted himself thereafter to the advancement of chemistry and technology in the new industry and to the welfare of the institution built up around it. After service at the Ministry of Munitions throughout the 1914-18 war, he remained in this country as a consultant and very largely as an educator in the technology of mining, on which he lectured in almost every senior educational institution. He occupied the principal offices at various times of the Institute of Mining and Metallurgy and the Institution of Chemical Engineers and was president of the Society of Chemical Industry in 1941-43.

Overseas News Items

Antimony Mining in Czechoslovakia.—Work has been started recently in the third antimony mine in Central Slovakia.

Oil Search in Western Australia.—A £1 m. company is to be formed shortly to explore for oil in Western Australia. Three-quarters of the capital will be subscribed by Richfield Oil Corporation of California and the remainder will be sought in Australia.

New Oil Well in Mexico.—The Mexican Government Petroleum Administration has announced the successful sinking of a new oil well at Reynosa, in the state of Nuevo Leon. Output is estimated at 1000 barrels daily. Six more wells are to be sunk in the area.

U.S. Employment Record.—U.S. civilian employment reached a new high level of 61 million jobs in July, reports the U.S. Department of Commerce. The figure was 300,000 greater than the previous record set in June and 1.6 million above the goal which economists have described as "full employment."

Expulsion Ordered.—The management of the British-American asbestos mines in Amiantos, Cyprus, served expulsion orders last week on more than 1000 striking miners and their families who live in the firm's houses. The miners occupied all surface and underground workings and declared their intention of remaining until wage demands were met.

India to Make Aluminium?—The report of the Provincial Industries Committee of Bombay, which has just been published, states that, while the Government of India is setting up iron and steel plants, the Provincial Government of Bombay should start production of aluminium, in view of the shortage of non-ferrous metals and of the fact that most of the raw material of aluminium is available in the Province.

Hungary to Produce Coke.—A Hungarian expert is said to have succeeded in producing coke from Hungarian coal and it is planned to erect a coking plant at Mohacs with an annual production of 250,000 tons, about half the country's annual coke requirements. Coal mined in the Komló region is considered to be the most suitable for this purpose. It is planned to produce asphalt, tar and its derivatives in conjunction with the new plant. Mohacs is apparently to become a new industrial centre in Eastern Europe; iron foundries are also to be erected, to use ores from Yugoslavia, Bulgaria and the Ukraine.

Acid-resistant Products.—A new Czechoslovak corporation for the production of acid-resistant materials has been formed under the name Acidotechna.

Polish Dyestuff Requirements.—Polish textile industry will require in the second half of the current year some 2500 metric tons of dyestuffs. Approximately 700 tons are to be imported.

Swiss Adviser in Egypt.—According to the *Egyptian Gazette*, a Swiss chemical expert, Dr. M. Fischer, has recently arrived in Cairo to study conditions in the country. Dr. Fischer will advise the Egyptian Government on the possibilities of establishing chemical laboratories, and priority would probably be given to the production of a DDT factory.

"Minor Planet" Falls in Russia.—A Soviet scientific expedition, now back in Moscow, reports that in February last year a meteorite scattering "an iron shower over an area of dozens of kilometres" fell on the Sikhotealin Ridge, north of Vladivostok. Using mine detectors, the expedition collected 257 meteorite splinters.

More Steel in the British Zone.—According to a statement made last month on behalf of the trustee administration of the iron and steel industry in the British zone to the non-party newspaper *Die Welt*, the situation of this branch of the German industry has recently improved to such an extent that no major unit is working at a loss. Output is at present running at about 50-60 per cent above that for 1947.

Poland's Iron-Ore.—Poland's planned production of iron-ore is expected to total some 700,000 metric tons this year and 850,000 tons in 1949. A further substantial increase is anticipated once investigations of promising iron-ore deposits to the west of Breslau have been completed. Pig iron production rose to 700,000 tons in 1946 and to 867,000 tons last year. Steel output rose to 1,579,000 tons (1.2 million tons before the war).

Expanding Italian Dyestuffs Production.—Italy's output of dyestuffs, colours, etc., is reported to have increased considerably since the end of the war. It is now in a position to cover the whole requirements of the home colour-using industries. The pre-war annual output of 14,000 tons of dyes was increased to about 20,000 tons last year and the corresponding figures for intermediate products are 40,000 and 50,000 tons respectively. It is intended to export this year 10,000 tons of dyestuffs and 25,000 tons of intermediates.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

GIBBS MANUFACTURING CO., LTD., Paignton, manufacturing chemists. (M., 21/8/48.) July 13, £12,500 debentures; general charge.

ANGLO-SCOTTISH PETROLEUM CO., LTD., London, S.E. (M., 21/8/48.) July 8, charge to Barclays Bank, Ltd., securing all moneys due or to become due to the bank; charged on Church Grange, Straightsmouth, Greenwich. *Nil. September 15, 1946.

J. K. INNES & CO., LTD., Carlisle, chemical engineers. (M., 21/8/48.) July 12, mortgage to Midland Bank, Ltd., securing all moneys due or to become due to the bank; charged on land at Kingsmoor, with motor garage, buildings, etc., and fixtures and fittings, etc.

Company News

The name of **Loganite Solvents Co., Ltd.**, 261 Boston Road, London, W.7, has been changed to **Loganite Trustees, Ltd.**, as from July 19, 1948.

The name of **Loganite Fuels (Liquid), Ltd.**, 261 Boston Road, London, W.7, has been changed to **Loganite Research Co., Ltd.**, as from July 22, 1948.

The name of **Low Temperature Carbonisation, Ltd.**, 82 Victoria Street, London, S.W.1, has been changed to **Coalite and Chemical Products, Ltd.**, as from July 16, 1948.

The nominal capital of **Wight Foam, Ltd.**, 54 Fairlee Road, Newport, I.W., has been increased beyond the registered capital of £100 by £500 in £1 ordinary shares.

The nominal capital of **W. H. Cooper & Co. (West End), Ltd.**, 104 Great Russell Street, London, W.C.1, has been increased beyond the registered capital of £100 by £9000 in £1 6 per cent cumulative preference shares.

The nominal capital of **British Plastics Products (Birmingham), Ltd.**, Rockland Works, Eagle Street, Coventry, has been increased beyond the registered capital of £4000 by £3500 in £1 ordinary shares.

The nominal capital of **Vitax Fertilisers, Ltd.**, Liverpool Road North, Burscough Bridge, has been increased beyond the registered capital of £15,000 by £10,000 in £1 shares.

The nominal capital of **Alkaline Batteries, Ltd.**, Union Street, Redditch, Worcs, has been increased beyond the registered capital of £100,000 by £100,000 in £1 ordinary shares.

Lancegaye Safety Glass (1934), Ltd., reports a net profit before payment of tax (£1782) of £5723 (£15,471 in the previous period of 15 months). No dividend is to be paid on the ordinary shares for the year ended June 30.

The directors of **The British Drug Houses, Ltd.**, have appropriated £30,000 to general reserve and recommended that a dividend of 6 per cent be paid on the ordinary shares, less tax, amounting to £19,800; leaving a balance to be carried forward of £14,425. Consolidated profits were £90,362, as against £91,637 last year. Of these consolidated profits £16,649 has been left undistributed in the possession of the subsidiary companies—principally in Canada.

Chemical and Allied Stocks and Shares

EARLIER in the week stock market business underwent a further decline, pending official news of the outcome of Moscow talks. Dealers were also awaiting full details of the big Imperial Chemical issue, which will bring in over £20 million. It was announced in the preliminary statement that the offer comprises 10,093,023 new £1 ordinary shares at 40s. 6d. each in the proportion of one new for every five held. At the current price of 46s. for the old shares, rights to the new issue work out at approximately 1s. per share. The city expects this big new issue to meet with success, despite the uncertain market conditions prevailing. Imperial Chemical shares offer a yield which compares favourably with the return on many other leading industrial shares, and, moreover, the directors expect the 10 per cent dividend to be maintained on the larger capital in future.

Monsanto Chemical 5s. ordinary have risen to 57s. 6d. at the time of writing,

Albright & Wilson 5s. ordinary were 28s. 6d., Amber Chemical 2s. shares 9s. 6d., Fisons were marked 58s., B. Laporte 5s. ordinary changed hands slightly over 20s., and Burt Boulton & Haywood at 26s. 9d. In other directions, William Blythe 3s. ordinary shares have transferred around 18s. 3d. Units of the Distillers Co. were 26s. 6d., United Molasses 47s. 7½d., and British Plaster Board 24s. 3d.

Amalgamated Metal shares eased to 18s. 7½d., the prevailing view being that it now seems unlikely the Government will allow the London Metal Exchange to re-open until next year. Borax Consolidated deferred at 58s. 1½d. were firm, the market assuming that the company's dollar earnings are probably increasing. British Aluminium were steady at 47s. Owing to dividend limitation it is realised that the British Aluminium will be kept at last year's rate, but, on the other hand, the business is continuing to grow both at home and overseas at such a pace that it would seem that sooner or later more capital will be required.

British Glues & Chemicals 4s. ordinary have eased to 18s. 6d., now the results have been published. British Industrial Plastics 2s. shares were 6s. 10½d., and British Xylonite £5. After their recent rise on the latest developments and company's capital plans, P. B. Cow 4s. ordinary receded to 17s. Elsewhere, Coalite & Chemical 2s. ordinary were 3s. 10½d. British Oxygen have been steadier at 97s. 6d., but in other directions, De La Rue eased to 39s. Lever & Unilever have been steady at 49s., and Metal Box shares were in demand and higher at £5. At 21s. 6d. General Refractories have been well maintained.

Triplex Glass 10s. ordinary at 25s. 9d. provided a good feature, responding further to the big profit increases for the past year and latest news of export trade. Iron and steel shares have been well maintained. The market assumes that the Government will go ahead with its nationalisation plans, but that they will relate only to iron and steel producers, and will not include other important sections of the industry. It is pointed out, that in any case it is extremely unlikely that nationalisation can be effected before 1950.

United Steel at 27s. 10½d., Dorman Long 28s. 10½d., and Colvilles 33s. were all quite well maintained. Boots Drug at 50s. 9d. held most of their recent improvement. British Drug Houses 5s. ordinary have changed hands around 9s. and Beechams deferred were 19s. 3d. Oil shares receded, awaiting international news. Anglo-Iranian came back to slightly below £8, sentiment

reflecting fears that the rise in the company's profits may be checked if the Palestine trouble continues to stop the flow of oil to the Haifa refinery.

British Chemical Prices

Market Reports

ACTIVE trading conditions are reported from most sections of the industrial chemicals market and new business has been on a substantial scale both for the home trade and for shipment. Pressure for deliveries under existing trading commitments has also been reported. There have been no important price changes and values throughout display a firm undertone. The list of articles exempted from Key Industry Duty has been renewed as from August 19 until December 31, 1948, with one or two amendments. The coal-tar products market is again without feature and offers are finding a ready outlet. Pitch is a good market both on home trade account and for export and the demand for creosote oil continues to be on a good scale.

MANCHESTER.—Holiday influences are still in evidence on the Manchester chemical market, but the effect of these during the past week has been less pronounced. Fair activity has been reported in respect of the volume of inquiry and the amount of actual business transacted. Textile and other principal industrial users of heavy chemicals in this area have been calling for steady deliveries under contracts and replacement buying has been on a fair scale. Shippers' inquiries have covered a reasonably wide range. In the fertiliser market a moderate business has been arranged in sulphate of ammonia, superphosphates and the compounds. The demand for the general run of tar products, both light and heavy, has been maintained at its recent level.

GLASGOW.—Business conditions in the Scottish chemical market have recovered from the holiday influences during the past week. Demand for certain materials has been heavy in relation to the relatively small stocks, which had been allowed to run low before the holiday season. No unexpected demand, however, has been noted. There has been a very notable improvement in the supply position of all grades of petroleum jelly, liquid paraffin and technical white oil since the disbandment of the Petroleum Board. In the export market, there have been no noteworthy changes. Inquiries have covered the whole field of industrial chemicals and a few orders have been received.

Rhine Valley Oil

Reported Austrian-Swiss Deposits

THE strong possibility that oil deposits worthy of exploitation may be found in the Upper Rhine Valley has been underlined by several recent reports in the Austrian and Swiss Press. According to one of these, drilling is already in progress in Austria's westernmost province of Vorarlberg. This has been denied by local government authorities and reticence is shown in all official circles, owing, no doubt, to the possibilities of political embarrassment.

According to a report in the authoritative *Neue Zuercher Zeitung* (Switzerland) a leading American oil concern has carried out investigations in the Rhine Valley and Austrian interests are reported already to have obtained three oil and gas concessions.

Geological investigations carried out so far in this area by both Austrian and Swiss experts have failed to give definite indications of the presence of oil deposits. However, the area contains many natural gas wells, not all of which are a result of alluvial deposits in the Rhine Valley. At Bezeegg, Egg and Altstätten, considerable quantities of natural gas have been discovered and in the latter locality drills were sunk to about 100 metres some years ago but the work did not yield any commercial results as had been expected. Much deeper drilling would be required to secure decisive evidence.

The possibility is not being ruled out that, as in the valley or the River Po in Lombardy, natural gas occurrences warranting exploitation on a commercial scale will eventually be found in deeper strata of the Rhine Valley. The probable connection between natural gas and oil deposits in the region of Lake Constance is already recognised. On the Swiss side, oil-bearing sandstone is known to occur at the Wattbachtobel between St. Gallen and the Pödersalp.

U.S. PLANS IN THE M.E.

The Sheik of the small British protectorate of Kuwait has granted an oil concession to the American Independent Oil Company, with regard to his half share of the so-called neutral zone between his country and the Kingdom of Saudi Arabia, states the *Petroleum Press Service*. The American company is a joint undertaking by the Phillips Petroleum Company and nine independent Middle Western companies. Royalties of \$2.50 (U.S.) per ton of crude oil produced—a record figure—have been agreed. Drilling will not begin until the approval of King Ibn Saud, who owns the second half interest in the area, has been given.

Belgian Trade Prospects

Demand for Chemicals "Enormously Increased"

A BRIEF report on Economic and Financial Conditions in Belgium (with an appendix on the Grand Duchy of Luxemburg) published recently by the Export Promotion Department of the BoT (price 1s. 3d.) states that demand for all chemicals has increased enormously in the absence of pre-war German supplies.

British manufacturers have apparently not been slow to capture a share of this trade and the chemical group has in recent months held the third or fourth place in U.K. exports to Belgium. Competition from local manufacturers in some lines is more severe than formerly but there is still a considerable sellers' market for certain goods. Dyes and other products for the textile industries are in short supply and ethical drugs find a ready market. Pharmaceuticals face competition from other countries but the British position is not unsatisfactory. The market has been given careful attention by suppliers and results are described as having been satisfactory at the end of last year.

The chemical industry has reached a rate of production equal to that of 1938. The main shortages are now salt, barytes and bones. Ample supplies of pyrites, sulphur and phosphate have been received. The bulk of the sulphuric acid is now retained in the country for the manufacture of fertilisers, the production of which is said to be at 160 per cent. of pre-war and to permit large shipments abroad. The manufacture of fine chemicals has been developed and the Belgian industry is trying hard to capture the place formerly held by Germany. Advances made during the occupation are being consolidated.

Oil at Lake Baikal?

According to reports received in London, the Soviet Russian authorities are carrying out an extensive geological survey of the Lake Baikal region where they hope to find sizeable oil deposits. At certain times of the year a porous and sticky substance of yellow or dark brown colour rises to the surface of Lake Baikal and has been used by the natives as a lubricant from times immemorial. Other indications have confirmed that large oil deposits occur in the region of this lake. Trial wells were drilled to a depth of about 350 metres in the area in 1902 and 1905, but no oil was encountered then.

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2, at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Synthetic hydrocarbons, lubricating oils derived therefrom and manufacture of the same.—Usines de Melle. April 15, 1942. 605,456.

Treatment of chlorine-containing rubber derivatives.—Firestone Tyre & Rubber Co. May 25, 1944. 605,460.

Manufacture of vat-dyestuffs.—Ciba, Ltd. Aug. 3, 1944. 605,466.

Laboratory apparatus for use in chemical analysis or synthesis.—M. J. H. E. Hustinx. Aug. 14, 1945. 605,467.

Condensation of ketene with keto esters or diketones.—Purdue Research Foundation. Oct. 2, 1944. 605,471.

Recovery of fluorides.—H. W. K. Jennings. Oct. 2, 1945. 605,472.

Process and apparatus for the decomposition of alkali amalgams.—Solvay & Cie. Feb. 9, 1944. 605,339.

Process of producing vinyl chloride.—Solvay & Cie. Jan. 6, 1943. 605,277.

Aluminium silicon alloys.—H. G. C. Fairweather. (National Smelting Co.) Dec. 1, 1945. 605,282.

Process for the manufacture of chlorinated derivatives of alpha-chloroethylbenzene.—Distillers Co., Ltd., E. G. Galitzenstein, and C. Woolf. Dec. 18, 1945. 605,284.

Production of regenerated cellulose sheet material.—British Celanese, Ltd. Dec. 20, 1944. 605,305.

Production of cellulose ethers.—Courtaulds, Ltd., and J. H. Macgregor. Dec. 20, 1945. 605,357.

Manufacture of synthetic resins.—A. Holden & Sons, Ltd., and S. R. W. Martin. Dec. 21, 1945. 605,388.

Luminescent compounds.—British Thomson-Houston Co., Ltd. Dec. 21, 1945. 605,398.

Quaternary ammonium salts.—I.C.I. Ltd., A. W. Baldwin, and F. S. Statham. Dec. 21, 1945. 605,402.

Cellulose derivative compositions.—British Celanese, Ltd. Dec. 21, 1944. 605,411.

Cellulose ether compositions.—British Celanese, Ltd. Dec. 21, 1944. 605,413.

Manufacture of resinous condensation products.—British Industrial Plastics, Ltd., A. Brookes, and F. L. Hudson. Dec. 21, 1945. 605,417.

Manufacture of methionine.—U.S. Industrial Chemicals, Inc. April 17, 1945. 605,311.

Catalytic process and apparatus.—Shell Development Co. Feb. 14, 1945. 605,515.

Process for the emulsion polymerisation of vinyl halides.—Bataafsche Petroleum Maatschappij Nov. 4, 1944. 605,516.

Process for the manufacture of co-polymerisation products.—Bataafsche Petroleum Maatschappij. March 23, 1944. 605,517.

Production of cellular materials.—Expanded Rubber Co., Ltd., A. C. Hutchinson, and S. D. Eagleton. Jan. 27, 1946. 605,519.

Synthetic resinous compositions.—E. I. Du Pont De Nemours & Co. Dec. 30, 1944. 605,526.

Process for refining textiles made of regenerated cellulose.—C. Bener. Dec. 30, 1944. 605,536.

Insulin preparations.—Soc. Des Usines Chimiques Rhone-Poulenc. Jan. 3, 1945. 605,538.

Manufacture of Sulphonamides.—Herts. Pharmaceuticals, Ltd., and D. E. Seymour. Dec. 31, 1945. 605,548.

Process for the recovery of potassium salts from solutions.—R. C. Noyes. (Norsk Hydro-Elektrisk Kvaelfstafaktieselskab.) July 28, 1939. 605,694.

Printing with ester salts of leuco vat-dye-stuffs and preparations thereof.—Durand & Huguenin A.G. Oct. 27, 1941. 605,696.

Manufacture of vat-dyestuffs.—Soc. of Chemical Industry in Basle. Nov. 1, 1943. 605,701.

Resinous compositions.—Westinghouse Electric International Co. April 1, 1944. 605,706.

Manufacture of copper catalysts and their use for hydrogenating organic substances.—Usines de Melle. Sept. 5, 1941. 605,767.

Substituted diamines.—Soc. des Usines Chimiques Rhone-Poulenc. June 22, 1943. 605,710.

Preparation of ditertiary alkylene diamines.—Soc. des Usines Chimiques Rhone-Poulenc. Sept. 7, 1943. 605,784.

Plasticised organic compositions.—Shell Development Co. Oct. 10, 1944. 605,573.

Dry-spinning of solutions of polymerised vinyl compounds.—Soc. Rhodiaceta. Aug. 24, 1942. 605,579.

Process of dry-spinning solutions of cellulosic derivatives in a closed circuit.—Soc. Rhodiaceta. August 24, 1942. 605,584.

Production of esters of hydroxy-alkoxy benzoic acids.—British Drug Houses, Ltd., F. M. Berger, W. Bradley, and F. G. Sayer. December 18, 1945. 605,737.

Method and apparatus for applying high-frequency electric currents to thermodynamic chemical reactions.—H. C. Lord, T. Lord, and B. M. Hartman (trading as L. L. H. Co.). December 22, 1944. 605,589.

Synthetic resinous moulding compositions.—H. Weber. December 31, 1945. 605,597.

Manufacture of quaternary ammonium compounds in paste form.—E. I. Du Pont De Nemours & Co., E. P. Hartsfield, and J. L. Richmond. December 31, 1945. 605,599.

Process for the manufacture of polymerisation products from vinyl chloride.—N.V. De Bataafsche Petroleum Maatschappij. March 1, 1943. 605,606.

Process for the decolouration of articles produced from halogen-containing high molecular compounds.—N.V. De Bataafsche Petroleum Maatschappij. Sep. 29, 1945. 605,607.

Manufacture of dyestuffs of the anthraquinone series.—Imperial Chemical Industries, Ltd., S. Coffey, G. W. Driver, and D. A. W. Fairweather. Jan. 1, 1946. 605,617.

Process for recovery of phenols.—Koppers Co., Inc. May 3, 1944. 605,635.

Atomisers.—Wellcome Foundation, Ltd., and F. G. Gebbett. Jan. 2, 1946. 605,648.

Coating of surfaces with compositions comprising synthetic resins.—Imperial Chemical Industries, Ltd., and W. E. F. Gates. Jan. 2, 1946. 605,651.

Chemical resistant glasses.—British Thomson-Houston Co., Ltd., and J. E. Stanworth. Jan. 2, 1946. 605,656.

Temperature indicators.—British Thomson-Houston Co., Ltd. Jan. 5, 1945. 605,658.

Composite mineral and metallic product and method of producing same.—H. O. Ross. June 15, 1945. 605,686.

Process of chlorination of aromatic hydrocarbons.—Solvay & Cie. Feb. 8, 1941. (Cognate Application 295/46.) 605,693.

Process for embossing sheet materials based on polyvinyl chloride.—Imperial Chemical Industries, Ltd., and W. L. Brogan. Jan. 4, 1946. (Cognate Application 3260/46.) 605,766.

Shaped polyamide products.—Imperial Chemical Industries, Ltd. Jan. 4, 1945. 605,767.

Resinous condensation products.—E. I. Du Pont De Nemours & Co. Jan. 4, 1945. 605,768.

Production and use of alkali alginate solutions. Courtaulds, Ltd., and E. E. Tallis. Jan. 7, 1946. 605,826.

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Perverting the Truth

EVERY chemist will remember that in his earlier attempts at qualitative analysis he was faced at times with conflicting evidence. He was also generally faced with the necessity to complete his analysis within the time prescribed by the school authorities. The combination of inexperience, panic and the desire to show results resulted in a conclusion being reached that was in accordance with what the student fondly believed to be the theory of probability. The deduction was made, all too often on insufficient grounds, that a specific compound was contained in the mixture in overwhelming proportion. Some 60 per cent of the observations agreed with that; the rest did not, but that was unfortunate. Those observations, he concluded, must have been faulty. Or at times he may have endeavoured to determine the proportion of an element present in a given substance. The inexperience of youthful manipulation as likely as not gave four distinct proportions in as many attempts. It then became necessary to select one of them—and, not infrequently, to “cook” the others to give the selection some verisimilitude when the master asked to see the books. Tell it not in Gath, but these habits have been known on occasion to persist beyond school-days. We recollect that a Reader in Chemistry in our University was accustomed to deal with feminine students who failed to secure the proper result by saying with his most pleasant smile: “Really, Miss X, that is

a wonderful result; how did you manage to get it? Was it your woman's intuition?” Too often, it was.

Yet in after-years we learned how some of the greatest discoveries have been made because a chemist or a physicist has refused to accept varying or anomalous results as “errors” and has painstakingly investigated all possible reasons before accepting the discrepancy. The study of science is a study of truth, and often truth takes a deal of discovering. The gravest and most responsible scientists have been led astray over and over again in the world's history by accepting an apparently sound hypothesis that later work has shown to be fallacious. Such an hypothesis has fitted most of the known facts, but mature experience suggests that unless an hypothesis fits all the known facts it is dangerous to accept it. The importance of preserving an attitude of independent scepticism is well understood by scientific men. This attitude oft-times makes them unpopular with their business colleagues, and with political powers. “Why,” it is asked, “cannot the fellow make up his mind and tell us what to do? We have to assess the facts on a theory of probability and take decisions accordingly”—in plain English, to guess and to back our guess. The scientist, on the other hand, must make reservations, if he feels that such reservations exist, and can state the truth only as he believes it to be at that time, making it clear that he must be allowed to

On Other Pages

Leader :	
<i>Perverting the Truth</i> ...	303
Notes and Comments :	
<i>Neglected British Minerals</i> ...	305
<i>The Outlook for Steel</i> ...	305
<i>Autumn Assemblies</i> ...	305
<i>Young Scientists</i> ...	306
<i>Register Service Extended</i> ...	306
<i>Rapid Reconstruction at Texas City</i>	307
<i>High Pressure Hydrogenation</i> ...	308
<i>Greasemaking Expedited</i> ...	308
<i>Record Exports in July</i> ...	309
<i>Performance Tests of Castings</i> ...	310
<i>American Commercial Plastics</i> ...	311
<i>The Trichloro Group in DDT</i> ...	312
<i>Trends in Horticultural Chemistry</i> ...	314

<i>India and Pakistan to Exchange Chemicals</i> ...	314
<i>High Strength Hydrogen Peroxide</i>	315

METALLURGICAL SECTION

<i>Continuous Casting of Steel</i> ...	319
<i>Non-Ferrous Metals in W. Germany</i>	322
<i>New Bonding Process</i> ...	322
<i>Advance in Powder Metallurgy</i> ...	323
<i>Electrolytic Metal Polishing</i> ...	324
<i>Rapid Steel Sampling</i> ...	326
<i>New Beryllium Alloys</i> ...	327
<i>Improved Surface Hardening</i> ...	327
<i>Current Welding Research</i> ...	328
<i>Brazing Magnesium</i> ...	328
<i>Current Welding Research</i> ...	328

change his opinion. "Don't ask me what I thought a year ago on this or that," said John Hunter, "ask me what I think to-day." And what he thought to-day might be quite different from what he would think a year hence when more facts had been accumulated.

This independent but flexible attitude of mind is the heritage of every scientist worthy of the name. Either he must retain it or he must cease to be a scientist. A Cabinet Minister resigns when he can no longer travel the same road as his colleagues; a scientific man—whether working in a university or in industry—should leave his work for some other occupation if he finds himself unable to pursue truth. There is a grave danger in the world to-day that truth may be distorted for political or other ends. The World Congress of Intellectuals seems to have proved that a proportion of the intellectual world is not concerned with truth so much as with putting forward specific policies or ideas. Mr. A. J. P. Taylor, of Magdalen College, Oxford, did well to insist that common standards were found to be lacking in those assembled. He stood, he said, for the unity of mankind, but if that could not be achieved, then he was for the common European tradition of intellectual liberty, more than one way of being right, freedom of mind, and the artist's freedom of creation.

That this cleavage of opinion seems to

occur in the more advanced scientific and intellectual circles makes it the more significant. Where is it leading us? In the same column of *The Times* that recorded the foregoing events of the Congress at Wroclaw, was a news agency paragraph summarising a Moscow broadcast. The Russian Academy of Science, it said, has written to Mr. Stalin admitting "mistakes" made by Soviet biologists, and promising for the future not to fall into such errors but to "co-ordinate their scientific work with the interests of the country for the development of Communism." This letter, we are told, acknowledged that Mr. Stalin should have all the credit for the achievements of the Academy and ended: "We promise you, dear Comrade Stalin, to correct our mistakes and to fight all reactionary theories. We shall take the necessary measures in order to ensure the unhampered development of a progressive Socialist theory of biology, in order to help the development of the great aims of our nation and the building up of Communism." It took a world-wide war to discredit the German biological theories of the "master-race." The danger of scientists forsaking the paths of truth cannot be over-emphasised, particularly when, as in Russia and earlier in Germany, they do so to support an ideology peculiar to a political theory.

NOTES AND COMMENTS

Neglected British Minerals

EMANATING from men who claim to be confident that Britain still has considerable reserves of unmined non-ferrous minerals, even though at the present time world supplies fall short of demand, a memorandum has just been submitted to the Minister of Fuel by the Cornish Mining Development Association, of Helston. It contains a proposal for the resumption, on a much larger scale than hitherto, of metalliferous mining in Britain. To make full use of these known reserves it is suggested that a metalliferous mining development corporation for the whole of Britain should be formed with a Treasury guarantee of aid. The corporation could, it is pointed out, be run in a similar way to the North of Scotland Hydro-Electric Board. The best possible advice would, of course, be taken in selecting the most favourable areas for mining operations, and exploratory mining would include anything up to a major programme of new shaft sinking. The memorandum adds that when the existence of ore-bodies worthy of more intensive development had been proved, the corporation could submit to the Minister for his approval detailed plans for working them. In order to attract private enterprise, the sound suggestion is made that undistributed mining profits and the first 20 per cent of dividends paid by non-ferrous metal mining companies should be free of tax.

The Outlook for Steel

THE knowledge that a crucial stage in the affairs of the British iron and steel industry, or at least of its principal sections, may now be near at hand seems to have produced so little apparent reaction in the spheres of administration or investment that the sweeping proposals for nationalisation which the Government certainly have not abandoned seem oddly remote. It required, in fact, the reminder given a few days ago by Mr. J. H. Jolly, the new chairman of Guest, Keen and Nettlefolds, to call to mind the unwelcome recognition that, failing active and organised opposition outside Westminster, British steel's prospect of continuing to

develop even in the condition of qualified independence prevailing now may not be worth much. It is conspicuous and rather lamentable that the case for the opposition has, as a whole, been presented with less enthusiasm than the proponents of nationalisation have displayed—with much less demonstrable justification. Effectively answering the fallacy that the iron and steel industry is virtually a monopoly exercised by a privileged few, Mr. Jolly's revelation that nearly 23,000 can exercise stockholders' rights to direct the affairs of Guest, Keen and Nettlefolds, more than half of them being "capitalists" only to the extent of £200 or less so far as this firm is concerned; and that only 1000 have £1000 or more invested is the sort of evidence that could be adduced by most other major steel undertakings. The remainder of the case is sustained by the continually rising volume of output which this allegedly misdirected industry has achieved; enabling it in July to exceed its end-of-year export level (£8.10 million) by £1.84 million and to maintain a credit balance on the same basis of £400,000 during the whole of the second quarter of this year. These are evidences which should weigh even in the estimation of those who affect to despise the iron and steel industry's capacity to make profits and maintain an apparently contented labour force.

• Autumn Assemblies

SEPTEMBER, the month of seasonal congregation in nature, seems to exert something of the same kind of influence on scientists, judging by the great assemblies taking place in the U.S.A., where the American Chemical Society has been organising very large meetings simultaneously in several cities and the American Association for the Advancement of Science has a programme for its Washington meetings (September 13-17) which corresponds roughly in its scope with the forthcoming meetings in Brighton of the British Association. In respect of size, the first of the American assemblies probably represents the limit for all practical purposes. This is evident from the fact that there is no one suitable city capable of housing all who will attend and

the papers presented number around 700. If subject matter is any true reflection of the general trend in chemistry, the biological field, with its 113 papers, might be assumed to engage a majority of ACS members. That evidence, however, is probably misleading. A more interesting speculation is concerned with the practical value of monster gatherings of the American kind, at which only a very small proportion of the whole can hear any individual paper and nearly all the enlightenment is finally communicated by the ordinary channels of publication. It is surprising to find, in view of the plethora of technical and scientific papers of this sort awaiting publication, that the technical Press in the U.S.A. sees fit to devote a relatively generous proportion of its space to British topics, such as the Royal Society Conference on Scientific Information—which received $2\frac{1}{2}$ pages in the *Chemical and Engineering News*—and our Parliamentary and Scientific Committee, to which the same journal devoted its leading article, observing: "Is it not time for the scientists and politicians of this country to develop an equally good, or perhaps improved, basis of co-operation between Congress and American scientists and technologists?"

Young Scientists

NINETEEN specialists, and about a hundred other young men with scientific qualifications, are to be given the chance in the near future to work at the Harwell Atomic Research Station, near Didcot, Berkshire. The specialists will be offered salaries ranging from £350 to £960 per annum. About 50 experimental and assistant experimental officers are required for service by the end of this year, and it is announced that the Civil Service Commission is holding an examination in order to obtain them. Candidates should be 18 years of age and the minimum qualification is a higher school certificate (or equivalent), with mathematics or a scientific subject, but suitable experience without academic qualifications is acceptable in some cases. Some of the successful candidates will be required to make routine experiments and measurements, and it is felt that girls would be particularly suitable for this work. In addition, about 50 scientific assistants are required for appoint-

ment by the end of the year. For boys of 16 the salaries offered are £155, rising to £276; and for girls of 16, £155 rising to £257 10s. The assistant experimental officers are required to be qualified in one or other of the subjects: physics, electronics, inorganic chemistry, metallurgy, or mathematics.

Register Service Extended

IT is interesting to learn that the Ministry of Labour's Technical and Scientific Register, originally designed to assist former members of the armed forces, has been developed into a nation-wide service for all men and women who are qualified scientists or technologists. A revised leaflet, recently published by the Ministry, explains the scope and functions of the register, which offers a free and confidential service to employers wishing to fill vacancies, and to men and women seeking technical or scientific posts. From its office in London it covers the whole country and posts overseas. Physicists, chemists and metallurgists are included in the register, and in order to qualify a registrant must normally possess a university degree or be a corporate member of the appropriate recognised professional institution. The register is divided into sections corresponding with the various professions. Each section is divided into three main groups: those not in employment, those seeking a change of employment, and those not seeking a change. There are advisory committees to link the register with industry. Sir Robert Pickard is chairman of the committee of chemistry, metallurgy and chemical engineers, and Sir Lawrence Bragg is chairman of another for physicists and mathematicians. It will be generally admitted that administratively the scheme seems admirable. There is, however, still good reason to believe that it is still viewed with a good deal of understandable suspicion by many scientists, whom it is ostensibly intended to benefit. It begins to look as though the thumbs are irrevocably turned down.

Export Control Alterations.—A number of essential oils and some chemical preparations are among goods which do not now require export licences. Changes in export licensing control were made by a Board of Trade Order which came into effect on September 1.

Rapid Reconstruction at Texas City

Production of Styrene Resumed Within a Year

TEN days before the first anniversary of the explosion which devastated their Texas City styrene plant, Monsanto Chemicals Limited resumed partial production when ethylene started to flow from the first rebuilt unit. Between April 16, 1947, the date of the explosion, and April 6, this year, when operations were resumed is a remarkable story of rebuilding a city and its industries which is told in full in a recent edition of the *Monsanto Magazine*.

\$90 Million Damage

The wide-spread damage to the plant occurred when an ammonium nitrate laden ship, berthed in a nearby public dock caught fire and exploded. After the explosion over 500 people were dead or missing, 3382 homes damaged or destroyed, and it was estimated the damage in the area amounted to \$90 million. Among the dead were 145 Monsanto employees, many of them highly skilled technicians.

In spite of the terrible effects of the blast, Monsanto and neighbouring plants have all returned to partial operation, though none of them have yet reached normal production capacity.

At Monsanto, where the chief producing

areas are ethylene, alkylation, hydrogenation and distillation, more than 2000 men have been engaged on the job of rebuilding. It is forecast by the company that other units will quickly follow ethylene into operation until the fully integrated plant is again turning out styrene for plastics.

An idea of the task the chemical engineers had to face can be gained from the fact that in the original plant there were 150 ft. high distillation towers, units, heaters, pumps, boilers, 50 miles of piping, 35 miles of copper tubing, 800 pieces of major equipment and more than 6000 delicate control and recording instruments. Completed in 1943, the plant had a former production capacity of 50,000 tons of styrene a year, a quarter of which went into the United States' war-time 800,000 ton synthetic rubber programme. One pound of styrene plus three pounds of butadiene combine to make four pounds of GR-S rubber.

Styrene is also the parent of a family of plastics, particularly polystyrene (Monsanto's Lustron), and in 1946 the company installed a \$1.5 million unit for Lustron.

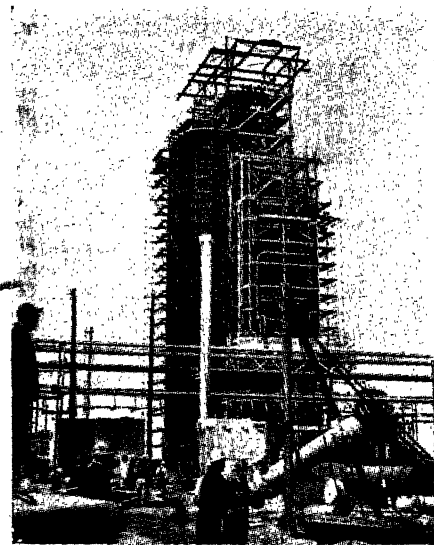
FATAL EXPLOSION AT CHEMICAL PLANT

AN explosion, followed by a small fire, occurred in the Stratford works of Messrs. A. Boake Roberts and Co., Ltd., on Friday morning, last week. The plant concerned was working on the iso-eugenol stage of the vanillin process.

Five operatives working in the plant were injured, two seriously. These two men, Mr. C. H. Bruce and Mr. H. R. A. Eagle, were taken to hospital suffering from burns and shock. Bruce died the following day. Eagle was detained and is making satisfactory progress.

The effects of the explosion were confined to one room.

THE CHEMICAL AGE was officially informed on Monday that it was expected production would be resumed "in a few day's time."



This recent picture shows reconstruction work in progress at Monsanto's plant

Chemical Glassware at Copenhagen Show.

—A comprehensive range of laboratory apparatus and glassware will be shown at the British Exhibition at Copenhagen, September 18 to October 3, by Quickfit and Quartz, Ltd., the chemical glassware manufacturers, who are a subsidiary of the Triplex Safety Glass Co., Ltd.

High Pressure Hydrogenation

German Research & Industrial Practice

DESCRIBED by the author as "a chemical engineer's view of one phase of the process which was by far the main source of synthetic liquid fuels consumed in Germany during the war years," a comprehensive monograph report by Mr. Peter W. Sherwood, of the Mellon Institute for Industrial Research, Pittsburgh, Pa., on German research and industrial practice in the field of liquid phase high pressure hydrogenation of carbonaceous matter, has just been released by the U.S. Office of Technical Services, Department of Commerce. Used primarily as a first step in the production of petroleum, this hydrogenation process is versatile and permits the manufacture of fuel oils, briquetting agents, and the like.

Source of Aviation Fuel

The process, the report states, was an outcome of methanol and other high pressure studies carried on by Dr. Mathias Pier and his colleagues at the I.G. Farben laboratories, at Ludwigshafen. Hydrogenation of coal, tar and oil was the source of 97.5 per cent of German aviation petroleum and 47 per cent of all hydrocarbon products in Germany during the later war years. The first reported work on high pressure hydrogenation of carbonaceous matter was that of Bergius in 1911. The Bergius non-catalytic process continued until 1930, when it was displaced by the more successful catalytic process developed by I.G. Farbenindustrie under the leadership of Dr. Pier.

The report contains flow sheets for the hydrogenation of petroleum residue, brown coal, coal tar, and bituminous coals and pitches. The suitability of various raw materials for hydrogenation in the liquid phase is discussed in detail, as is the chemistry of coal hydrogenation. The chemistry of the liquid phase, thermodynamic efficiency of coal hydrogenation, effects of various catalysts on the liquid phase, influence of various conditions on the products, equipment used, control instruments, and methods of analysis are among the many subjects discussed in the report, which is also illustrated with diagrams, and numerous tables.

Copies of the 244-page report, No. PB-88839, entitled, "High Pressure Hydrogenation in Germany—the Liquid Phase," may be purchased for \$6.25 each from the Office of Technical Services, Department of Commerce, Washington 25, D.C., U.S.A.

Greasemaking Expedited

New Continuous Process

FOLLOWING several years' research and technological development to perfect a continuous greasemaking process, a new plant for large-scale production of lime soap greases by such means will shortly start production at the Baltimore refinery of Esso Standard Oil Company. Employing lime, animal or vegetable fats, and oil, the continuous process for making grease revolutionizes greasemaking because of its speed, its economical use of fatty ingredients and the uniformity of the finished product.

Several devices give the new continuous process its great precision and economy of operation, materials and time. One of the major achievements is the mixer, which blends soap and oil so well that less soap, in proportion to oil, yields an identical grade of grease. This permits the use of about 10 per cent less fat—an important saving when fats are scarce.

Production Accelerated

The key unit in the new process is a rapid soap cooker, which in 45 minutes completes the three-and-a-half hour job of the old pressure kettle. The rapid cooker consists of a heat exchanger and three tanks, each of which hold 2000 lb. of soap mixture. The raw materials, lime and fat, are pumped into the first tank, circulated through a heat exchanger and back into tank No. 1 until the soap is finished. Meanwhile, tank No. 2 is filled in readiness for cooking as soon as No. 1 is finished, and tank No. 3 is discharging soap into a mixer where mineral oil is added.

Automatic Control

The mixer, or disperser, is a system of loose gear revolving 3600 times a minute. Soap enters the mixer from the tank at one side, oil from the opposite side, and the two are blended amid cyclonic turbulence. The finished grease is steadily forced out of a filling pipe. Under the old system of greasemaking, packaging of the finished product could not begin until the entire batch had been completed. Now, because finished grease is produced as soon as the mixer starts to run, packaging is carried on simultaneously.

A pressure viscometer, continuously takes a tiny sample of the finished grease from the filling line. If there is any change in consistency, the instrument automatically operates valves which halt the mixing until the plant operator finds the difficulty and corrects it.

RECORD EXPORTS IN JULY

THE value of chemicals, excluding drugs and dyestuffs, exported from this country during July was the highest monthly total so far this year—£4,520,840, compared with £3,893,387 for June, the next best month. The latest issue of the *Trade and Navigation Accounts of the U.K.* (HMSO 4s. 6d.), in which these figures are published, also shows that July's total was over £500,000 more than the corresponding

accounting period of the previous year.

Generally, quantities of exports were above the preceding month and among the higher increases were ammonium sulphate, + 14,000 tons, bleaching powder, + 5000 cwt., cresylic acid, + 80,000 gallons, and tar oil, creosote, anthracene oil, etc., which were over 150,000 gallons higher. Sodium carbonate and potassium compounds also showed considerable increases.

CHEMICAL EXPORTS IN JULY

	July 1948 Cwt.	July 1947 Cwt.
Formic acid	2,172	1,749
Salicylic acid and salicylates	223,216	167,136
Tartaric acid	728	579
Value of all other sorts of acid ...	£26,990	£67,352
Aluminium oxide	414	437
Sulphate of alumina	2,179	2,348
All other sorts of aluminium compounds	619	345
Ammonium sulphate	38,126	38,553
Ammonium nitrate	7,042	709
All other sorts of ammonium compounds	1,335	1,083
Bleaching powder	33,386	46,374
All other bleaching materials	11,546	10,772
Calcium carbide	1,373	2,616
Benzol	3,266	6,853
Cresylic acid	276,938	240,333
Naphthalene	1,980	1,387
Tar oil, creosote oil, anthracene oil, etc.	3,102,099	9,302,061
Value of all other sorts of tar oil, etc.	£134,857	£35,188
Collodion cotton	1,731	1,917
Copper sulphate	2,038	4,583
Disinfectants, insecticides, etc. ...	85,194	63,986
Fertilisers	1,857	1,812
Glycerine	2,209	1,401
Lead acetate, litharge, red lead, etc.	12,406	3,039
*Tetra-ethyl	65,375	106,171
Magnesium compounds	879	766
Methyl alcohol	10,788	193,365
Nickel salts	3,690	8,686
Potassium compounds	8,635	7,830
Salt	13,987	13,079
Sodium carbonate, etc.	432,545	235,935
Caustic soda	164,562	178,519
Synthetic sodium nitrate	—	21
Sodium silicate	18,388	9,114
Sodium sulphate	51,512	49,293
All other sodium compounds	96,461	72,276
Spirits refined	4,129	5,669
Cream of tartar	156	391
Tin oxide	661	1,325

	Tons	Tons
Zinc oxide	1,276	1,149
Total value of chemical manufactures, excluding drugs and dyestuffs	£4,520,840	£4,001,766
Quinine and quinine salts	199,940	262,106
Acetyl-salicylic acid	147,445	180,749
Insulin	1,600,312	706,218
Penicillin	422,897	124,771
Total value of drugs, medicines and preparations	£1,265,863	£1,584,161
Total value of dyes and dyestuffs ...	£694,467	£630,697
Total value of chemicals, drugs, dyes and colours	£7,581,387	£7,176,934
Plastic materials, other than casein and celluloid, etc.	35,249	26,341
Value	£427,866	£320,393
Chemical glassware	1,329	1,053
Value	£50,147	£43,797
Furnace plant	369	346
Value	£97,281	£63,169
Coal	1,263,738	66,653
Value	£4,717,558	£151,779

CHEMICAL IMPORTS

	July 1948 Cwt.	July 1947 Cwt.
Acetic acid	24,660	7,992
Boric acid	7,840	6,400
Tartaric acid	500	4,000
All other acids	3,006	3,261
Ammonium phosphate	—	3,300
Arsenic	1,230	297
Borax	17,728	14,800
Bromine and bromides	394	663
Calcium carbide	4,237	1,670
Coal tar products, excluding benzol and cresylic acid	11,821	1,001
Cobalt oxides	679	584
Fertilisers	5,203	847
Iodine	66,050	59,569
Potassium chloride	813,454	798,474
Potassium sulphate	50,900	30,480
Other potassium compounds	4,672	2,020
Sodium nitrate	—	19,940
Carbon black	67,044	75,260
Plastic materials, other than casein and celluloid, etc.	11,679	37,797
Total value of chemicals, drugs, dyes and colours	£3,143,125	£2,447,407

PERFORMANCE TESTS OF COATINGS

Scientific Estimation of Durability and Colour

From a Special Correspondent

AMONG the advanced equipment now being used for physically testing paint applications are devices for determining the adhesion and scratch hardness, flexibility, extent of protection afforded, and electronic colour matching, which have been developed during and since the war.

For adhesion and scratch hardness, one apparatus suffices for both tests. For scratch hardness, to the surface being tested a diamond-point cutting tool is applied by a lever arrangement carrying a beam and weight, the load being measured in grs. This is applied to the point, which moves across the surface at constant speed and cuts repeatedly in a fixed position until the sub-surface appears. A measure of the scratch hardness is obtained by the load on the beam, and the number of strokes required to wear through the film.

For accurately measuring the extent of adhesion of the film, this cutting arrangement is connected with a movable platform, which can be adjusted laterally by a notched wheel and precise screw thread. A standard stress is applied at progressively smaller spacings, until this is sufficient to displace the coating in the area between the cuts. That is the basis of the test. In this way, it is possible to ascertain the relative adhesion of a given coating to various sub-coatings and base metals, as well as revealing how varying conditions have affected the extent of adhesion by ageing, etc.

Flexibility and Extent of Protection

For determining flexibility, one post-war apparatus is mounted with an observation well in a vertical position and water is held by a hypodermic syringe in contact with the paint film being tested. Connected to a galvanometer are two wires, one of which is attached to the hypodermic needle and the other to the test panel. The latter is rigidly clamped and the machine is operated by a constant-speed drive which is geared to a thrust spindle of 3/16 in. diameter.

In this arrangement the paint film acts as an insulator, and when it fails an electric current is enabled to flow, as the water contacts the steel test panel. A galvanometer is deflected in this way, whereby the end-point of the test is indicated.

The thrust is measured in 1/100 mm. and a fixed table is used to convert this to percentage elongation, and in which way the points where failures occur after various degrees of exposure on identical panels are accurately recorded for comparison.

The panels used for both the adhesion determinations, and the flexibility test, approximate to 6 in. by 4 in., and the apparatus in each instance does not cover more than 1 sq. ft. of bench area.

For indicating the protective value of metal finishes, a further improved measure is to apply thin uniform films to sheets of iron foil which are approximately 2/1000 in. thick. When the test panels are exposed to accurately controlled humid atmospheres in the laboratory, rusting takes place rapidly underneath the thin paint film. This stimulates what would occur in service conditions with structural steel, and the time which elapses before rust spots appear indicates the degree of protection which the paint under test affords. While this technique does not permit dispensing with existing test methods, it acts as a reliable supplement.

Electronic Colour Matching

The photo-electric spectrophotometer was first introduced towards the latter stages of the war, its special use then being to match camouflage colours so that infra-red cameras used by enemy observers would fail to detect them. (Due to the different amounts of infra-red received, two objects, which to the eye have the same colour, may photograph differently.)

The spectrophotometer gives a measure of both visible and invisible colour, as this determines the amount of light, or infra-red wavelength, which is absorbed by any paint. To-day, the apparatus is engaged to establish the colour for all descriptions of paints, enamels, and finishes, and takes the form of an electronic device.

This changes colour matching from an ordinary testing art to an exact science and, besides providing a permanent record, obviates the need for standard colours for each determination.

The essential features of the device are a monochromator, a photo-electric photometer, and a recorder, where white light is first spread into spectrum colours by one prism and amplified by another prism. Monochromatic light passes through two Rochon prisms and a Wollaston prism, which collectively generate two beam components, while a photo-tube takes a view from a frosted glass.

Discolorations of organic finishes, and the effects of heat, light, humidity, grease, and ultra-violet radiation, etc., can also be accurately confirmed for future comparison by this system of colour matching.

AMERICAN COMMERCIAL PLASTICS

Practical Progress Reported at ACS Congress

THE papers presented at the 114th national congress of the American Chemical Society covered subjects as widely divergent as plasticisers and crop-protecting chemicals.

Mr. W. A. Woodcock, of the Carbide and Carbon Chemicals Corporation, New York City, said that production of plasticisers was nearing an unequalled high level of 200 million lb. this year. This development, he said, was a corollary of the tremendous expansion of the plastics market since the war, pointing out that the type of plasticiser employed was primarily responsible for the specific properties of various plastics, such as heat stability, oil resistance, and flexibility at low temperatures.

As an example of the progress made in the plasticiser field in recent years, Mr. Woodcock recalled that shower-bath curtains made in the late 1930's employed too volatile plasticisers, resulting in premature losses which made the curtains stiff. "Another plasticiser was used and this cut down the volatile losses," he said. "But it was found then that the portion of the curtain most often in contact with water became stiff, although the rest of the curtain was pliable. A third plasticiser was used and found satisfactory in volatility and water resistance, but then it developed an obnoxious odour in storage. These principal deficiencies have been corrected now with the modern vinyl shower-bath curtain."

Improved Pliability

New demands were creating new and better plastics, Mr. Woodcock said, adding: "Progress in solving this problem has been relatively rapid in spite of the complicating limitations imposed on each product." The industry, he pointed out, only last winter found that it must consider properties desired between processing and use. Some butchers' aprons, he said, were made up with an experimental plasticiser of the polyester type. They were intended for indoor use and consideration for low temperature flexibility had not been a prime consideration. When they were distributed during one of the colder spells they fell to pieces.

A plasticiser called trioctyl phosphate, or "TOF," was developed which was very effective in lowering the brittle temperature and developing excellent pliability, Mr. Woodcock said. "Through the judicious use of mixtures of plasticisers," he continued, "it has become possible to correct the individual product deficiencies. The art of such mixtures is only now developing but

very definite progress has been noted. One of the reasons for the rapid advance in plasticiser developments is the close technical relationship between user and supplier. The old tendency to put products into general bins of stated character is slowly disappearing. More and more the suppliers are recognising the specific nature of each type of product made."

Adapting War Chemicals

At another section of the Congress, Raymond C. Crippen and Mr. Leonard Buchoff, of Penniman and Browne, Inc., Baltimore, reported that a chemical used during the war to make mustard gas had been adapted to a peacetime rôle in protecting crops, and added that they had found other uses for the chemical thiodiglycol in the manufacture of resins, plastics, oils and petroleum. The research chemists reported that "sticking" agents were prepared from the chemical for insecticides and fungicides which mixed with water and then "stick" longer when they were sprayed to protect crops. Thiodiglycol was similar to a combination of ethylene glycol ("prestone") and sulphur. It was a thick, water-soluble, amber fluid which did not boil under 330°F., and also gave protection against freezing down to 10°F. There were large quantities of the compound available in storage.

Another chemical used during the war was now being employed as a fertiliser for seedlings and as a feed supplement. It was green manganous oxide which was used as a flux in welding light metals. Other uses which had been discovered for this oxide were as an ingredient in welding rod castings, as a "trigger" for organic reactions, as a primer pigment for paints, and as a paint drier. It was found especially adaptable in agriculture, since it dissolved slowly in the soil and did not produce toxic concentrations. Noting that manganese was essential to reproduction and to life itself, and that it worked with iron, the researchers added that "perhaps doctors will prescribe it in the future as well as iron for anaemia."

New U.S. Tanker Service For Chemicals.

—The Celanese Corporation of America has announced the completion of tanker facilities for the shipment of bulk chemicals from its chemical plant at Bishop, Texas, to the Eastern seaboard. This tanker service combines the most modern marine equipment with new chemical control technique and represents the first tanker movement of bulk formaldehyde in the country.

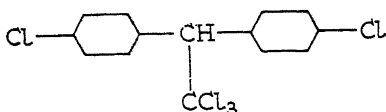
The Trichloro Group in DDT

Probable Basis of Insecticidal Potency

by R. W. MONCRIEFF, B.Sc., F.R.I.C.

THE outstanding efficacy of DDT as an insecticide and as a means of destroying body lice has led naturally to an investigation to determine to what structural features of its molecule its remarkable powers are due.

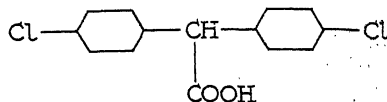
The structure of DDT itself is familiar to most. Its systematic name is *pp'*-dichloro- α - α -diphenyl- $\beta\beta\beta$ -trichloroethane and its structure is:—



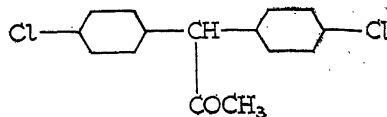
A first inspection of the molecule would hardly lead one to suspect that it would have any unusual properties, although on giving the matter closer thought one is struck by the high chlorine content which is typical of many moth-proofing agents, notably the Eulans of I. G. Farbenindustrie A.G. and Lanoc C.N. just recently introduced by the I.C.I., as well as Mystox B in which the active agent is pentachlorophenol. Another feature which may be noted in the structure of DDT is the presence of the trichloro-group C Cl_3 , the same group as constitutes practically the whole of the chloroform molecule CH Cl_3 .

The idea has been put forward by Luger, Martin and Muller that the potency of DDT is due to a combination of the toxicity of the bis (chlorophenyl) methane system and of the inhalation-anæsthetic group— C Cl_3 . If this were true it would be expected that substances otherwise similar in constitutional features to DDT but in which the —C Cl_3 group had been replaced by other groupings would not exhibit the extreme toxicity to insects which is characteristic of DDT itself.

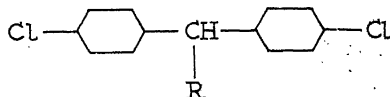
Very recently publication has been made of the results of work directed to this end. Two compounds generally similar in structure to DDT but lacking the —C Cl_3 were prepared and their toxicity towards insects evaluated. The work is described by Erlensmeyer, Bitterli and Sorkin² in a very recent issue of *Helvetica Chimica Acta*. The two substances prepared were *pp'*-dichlorodiphenyl-acetic acid:—



and *pp'*-dichloro- α -diphenylacetone:—



It will be seen that both these substances and DDT itself may be written in the general form:—



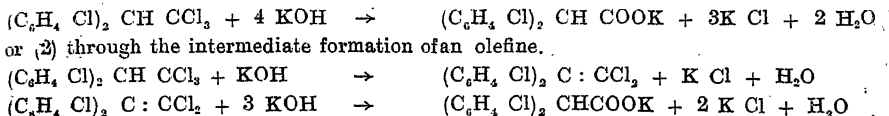
where R is respectively —COOH , —COCH_3 , and —CCl_3 , and if, therefore the properties of DDT itself are specifically due to the presence of the —CCl_3 group these other substances should be very much less potent.

Preparation of Dichlorodiphenyl-acetic Acid

The acid was prepared from DDT itself by hydrolysis with alcoholic potash in an autoclave. Such severe conditions are necessitated by the stability of DDT to chemical reagents, a feature which was noted in 1874 by the German student who first prepared it as part of his work for his degree thesis, a feature which made him consider his new product uninteresting from a chemical standpoint and apparently dissuaded him from continuing an investigation of its properties. So easily are chances missed; had the discovery of its insecticide properties been made then the course of history would have been changed, for the louse has lost more campaigns than any general.

The hydrolysis was carried out as follows. Thirty grams of DDT and a solution of 80 g. potassium hydroxide in 540 c.c. ethyl alcohol were heated together in an autoclave at 100–110°C. for 80 hours. The mixture was poured into 2 litres of water and the solution boiled in animal charcoal and filtered. The filtrate contained the potassium dichlorodiphenyl acetate and on acidification with 50 per cent sulphuric acid this was converted into the required acid and on recrystallisation from 80 per cent ethyl alcohol a

purified product was obtained melting at 165-166°C. The yield was 18 g., i.e., 76 per cent of theory. It is interesting to note that the hydrolysis of the DDT to the potassium salt of the acid may take place in two ways, (1) direct hydrolysis:—



For purposes of identification and characterisation the acid was converted into its ethyl ester. Esterification was accomplished by heating 4.2 gr. dichlorodiphenyl acetic acid with 25 c.c. absolute alcohol and 1.0 c.c. sulphuric acid for three hours. This gave 3.5 gr. (76 per cent yield of theory) ethyl dichlorodiphenyl acetate which was purified by recrystallisation from absolute alcohol and then melted at 87.5-88°C. Elementary analysis of this product established its identity:—

$(\text{C}_6\text{H}_4 \text{ Cl})_2 \text{ CHCOOC}_2\text{H}_5$ is $\text{C}_{16} \text{H}_{14} \text{O}_2 \text{Cl}_2$ which requires 62.11 per cent carbon (62.21 per cent found) and 4.56 per cent hydrogen (4.75 per cent found).

Biological Properties of the Acid

The biological testing of the dichlorodiphenyl-acetic was carried out by Ciba Ltd., and resulted as follows:— Towards the housefly *Musca domestica*. A very weak toxicity was shown.

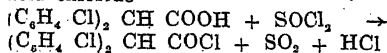
Towards the moth *Tinea granella*. No action.

Towards the beetle *Dermestes frischii*. No action.

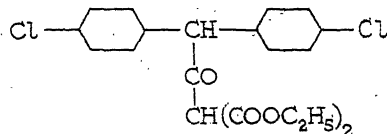
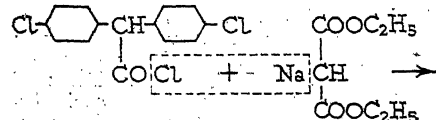
Preparation of *pp'*-Dichloro- α -diphenyl acetone

The preparation of this substance from DDT itself was accomplished in the following steps.

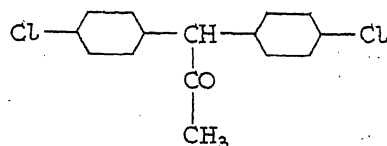
(1) DDT was converted into dichlorodiphenyl acetic acid, as already described, and this was reacted with thionyl chloride under reflux for three hours to give the acid chloride



The acid chloride was reacted with malonic ester and sodium benzene:—



and on hydrolysis this gave the corresponding ketone



This compound has the empirical formula $\text{C}_{15}\text{H}_{12}\text{OCl}_2$ which requires carbon 64.53 per cent (64.25 per cent found) and hydrogen 4.33 per cent (4.70 per cent found).

Biological Properties of the Ketone

Tested by Ciba, Ltd., the dichlorodiphenyl acetone was found to be useless against the housefly, the moth and the beetle, insects similar to those that had been used for testing the corresponding acid.

Compounds similar to DDT but in which the $-\text{CCl}_3$ group has been replaced in the case of an acid by the $-\text{COOH}$ group and in the case of a ketone by the $-\text{COCH}_3$ group have been prepared by Swiss workers.

These compounds known respectively as *pp'*-dichlorodiphenyl-acetic acid and *pp'*-dichloro- α -diphenylacetone fail to show any effective insecticidal activity and it appears therefore that DDT owes its potency at least in part to the presence of the $-\text{CCl}_3$ group. This group which occurs also in chloroform and in chloral hydrate may be responsible for an inhalation-anæsthetic effect and this property combined with the toxicity of the dichlorodiphenyl methane residue in DDT may account for the high potency of this substance.

References

1. P. Langer, H. Martin and P. Muller. *Helv. Chim. Acta.* 27, 892-928, (1944).
2. H. Erlenmeyer, P. Bitterli and V. E. Sorkin. *Helv. Chim. Acta.* 31, 466-470, (1948).

Trends in Horticultural Chemistry

Functional Studies of Copper and Chlorine

ALTHOUGH the cupric ion will kill many types of fungus spores, soluble copper salts cannot be used as protective fungicides on plants owing to their marked phytotoxicity, stated Dr. R. L. Wain in the course of a lecture entitled "Recent Developments in Horticultural Chemistry," which he delivered recently at Wye College before the London and South-Eastern Counties Section at the Royal Institute of Chemistry, and of which the following is a summary. For such purposes, said Dr. Wain, sparingly soluble copper compounds like Bordeaux mixture are used. The dried deposit of this excellent fungicide yields only 0.5 p.p.m. of copper to water and since this concentration is insufficient to kill most fungus spores, it would appear that there are other agencies operative in bringing copper into solution. That carbon dioxide in the air or excretions from the sprayed leaf might be important factors is disproved since Bordeaux deposit on glass is fungicidal in atmospheres free of carbon dioxide. On the other hand the fungus spore itself has been shown to exude substances capable of dissolving copper from Bordeaux, an effect which Wain and Wilkinson proved could only occur through complex ion formation.

The results of a chemical investigation of the exudate from 8×10^4 fungus spores, and those of a series of solubility determinations enabled these workers to suggest a mechanism for the fungicidal action of copper which has led to the possibility of assessing fungicidal value by chemical means.

The hypothesis of Martin and Wain to explain the contact insecticidal action of DDT is based on a study of DDT analogues in which the central $>\text{CH}-\text{CCl}_2$ grouping and the *para* nuclear substituents

have been modified. The fact that DDT loses HCl readily to produce a non-insecticidal ethylene derivative indicates that the $>\text{CH}-\text{CCl}_2$ grouping is the toxophore. Modification of this affects insecticidal activity and it was found that when HCl elimination is impossible, as for example with $>\text{CH}-\text{CH}_2$ or $>\text{CCl}-\text{CCl}_2$, the substance was non-insecticidal. The chlorophenyl groups would seem to assist penetration of the molecule as a whole to its site of action on the nervous tissue of the insect for replacement of the *para* chlorine atoms by more polar groupings such as hydroxyl destroys contact insecticidal action. Symmetry in the DDT molecule is also important, this no doubt enabling more facile orientation of the molecule at the sensitive orientation of the molecule at action, $p,p' > m,p' > o,p' > o,o'$.

The properties and insecticidal action of benzene *hexa*-chloride are in accordance with the HCl theory, for example, the almost non-insecticidal β -isomer loses HCl with difficulty whereas the highly active γ -isomer is most readily dehydrochlorinated. The hypothesis has also proved most useful in the search for new contact insecticides as is shown for example by the discovery of chlordane, $\text{C}_{10}\text{H}_6\text{Cl}_8$, by American workers.

The study of plant growth-regulating substances has opened up wide fields of research from which applications of considerable horticultural importance have developed. An account was given of recent work carried out at Wye on the effect of synthetic chemicals on the healing of wounded plant tissue, production of seedless fruit, rooting of cuttings and the inhibition of bud burst in fruit trees.

India and Pakistan to Exchange Chemicals

CHEMICALS and pharmaceuticals figure prominently in an agreement between India and Pakistan for the mutual supply of certain essential commodities. Supplies will ordinarily be made through normal commercial channels during the period of the agreement which will be one year from July 1 last.

India has agreed to supply Pakistan with 270 tons of hydrochloric acid, 200 tons of nitric acid and 800 tons of magnesium sulphate. Other Pakistan requirements, which include 2000 tons of sulphuric acid, 2000 tons of aluminium sulphate and 400 tons of ferrous sulphate, are to be examined in Delhi.

In return, Pakistan has agreed to supply

India with the 2 million mds. of rock salt, and the 5000 tons of potassium nitrate requested. India also listed 10,000 tons of soda ash among her requirements. The Pakistan factory is at present closed, but is expected to get into normal production by the end of this year. It is hoped to meet India's demand in 1949.

India and Radioactive Isotopes.—It has been decided that all matters connected with the procurement of radioactive isotopes are to be handled in India by the Board of Research on Atomic Energy in consultation with the Department of Scientific Research.

HIGH STRENGTH HYDROGEN PEROXIDE

The British Double Distillation Process

by V. W. SLATER and W. S. WOOD

THE British method⁷ of producing high strength H_2O_2 is a double distillation process wherein the 35 per cent hydrogen peroxide is first purified and fractionated to a 70 per cent solution and is then redistilled and fractionated to give a pure 90/92 per cent product.

In the first stage the 35 per cent solution is fed to an externally heated vertical tube, and the mixture of vapour and liquid passes into a separator from which the vapours pass to a fractionating column, while the liquid goes to a reservoir connected to the bottom of the vertical evaporator, thus forming a closed cycle with the bulk of the liquid kept unheated in the reservoir. The fresh 35 per cent solution is fed continuously to the vertical evaporator and the strength of the hydrogen peroxide in the cycle builds up to an equilibrium such that the strength of the vapour produced is equal to the strength of the feed peroxide.

The second stage is of similar design to the first and is connected directly to the supply of liquor coming from the fractionating column of the first stage. In this

second closed cycle the concentration builds up so that the strength of vapour produced may be fractionated to give hydrogen peroxide of 90 per cent or higher strength.

High Strength H_2O_2

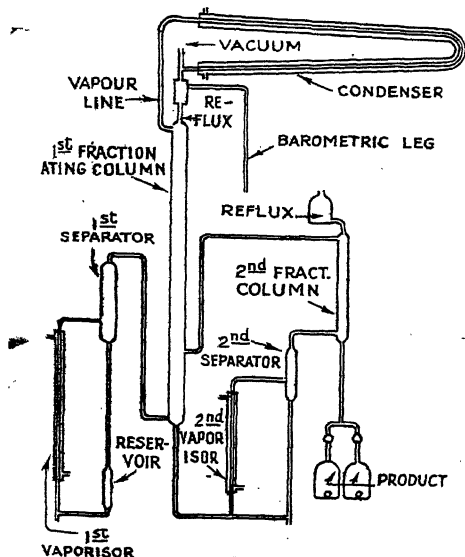
The term high strength hydrogen peroxide usually refers to solutions containing at least 70 per cent by weight H_2O_2 , and in fact, more usually to 80 per cent H_2O_2 . It is a clear colourless free-flowing liquid, resembling in appearance, say, accumulator acid.

The two properties which are of particular value are its considerable heat of decomposition which can be readily made available by simple catalytic decomposition and its high oxidising power which may produce considerable energy during the oxidation or combustion of organic compounds and certain inorganic compounds, such as hydrazine hydrate.

The decomposition can be readily demonstrated by pouring a very fine stream of the high strength solution on to a few crystals of potassium permanganate contained in a conical flask when, with 70 per cent solutions, all the hydrogen peroxide added is completely vaporised, while with higher strengths the steam produced is superheated.

The ignition of organic material can also be simply demonstrated by adding a drop or two of 80/90 per cent hydrogen peroxide on to a piece of cotton cloth, with and without a trace of iron rust on the cloth. The ignition of the clean cloth is usually delayed for some minutes, whereas the dirty cloth ignites almost immediately.

It will be of interest to note the available oxygen which can be obtained from various strengths of hydrogen peroxide as well as the heat developed. As is well known, one atom of oxygen is given up by the decomposition of one molecule of hydrogen peroxide and, according to Matheson and Maass,⁸ the decomposition of one gram molecular or liquid hydrogen peroxide into water and gaseous oxygen at atmospheric pressure liberates 23,450 calories of heat.



The British process in diagram

The first part of this paper, reproduced by courtesy of the authors and of Laporte Chemicals, Ltd., and the British Interplanetary Society, appeared in THE CHEMICAL AGE, August, 28.

TABLE 1.

H_2O_2 per cent. wt/wt.	Available Oxygen per cent.	Heat of decomposition K.cals/Kg. B.Th.U./lb.
100	47.04	690
90	42.43	621
80	37.63	551
70	32.93	483
30	14.11	207

Table 1 shows the oxygen content and heat of decomposition for various strengths of hydrogen peroxide. It illustrates the high available oxygen content of solutions which can be transported in comparatively simple light-weight equipment.

The high heat of decomposition is of value in that it enables high strength hydrogen peroxide to be used as a convenient source of superheated steam. This is illustrated in Table 2 which gives the approximate temperature of the mixture of superheated steam and oxygen formed by the complete decomposition of various strength solutions of hydrogen peroxide.

It allows the production of high pressure steam in small units, and a particularly good example of this is the turbine used for driving the pumps for the V.2 rocket weapon. This application was dealt with recently in a paper given by H. Wheeler⁹ to the Institution of Chemical Engineers in March, 1948.

TABLE 2.

H ₂ O ₂ per cent. w/w	Approximate temp. of vapour °C.
100	940
90	700
80	450
70	200
30	90

Density and Concentration

It is necessary in considering the application of hydrogen peroxide to have some knowledge of the relation between density and concentration. The density of various concentrations has been determined by a number of workers of which perhaps the best known results are those by Maass and Hatcher.¹⁰

Table 3 gives figures determined in our laboratories (Laporte Chemicals, Ltd.) on the product as manufactured. The table also includes the older method of expressing the concentration of hydrogen peroxide as volume strength, which is based upon the volume of oxygen obtained at normal temperature and pressure from unit volume of the solution.

TABLE 3.

H ₂ O ₂ per cent. wt/wt.	H ₂ O ₂ per cent. wt/vol.	Volume Strength	Specific Gravity	Approx. lb./gal.
180	144.5	479	1.456	14.6
90	126.5	418	1.404	14.0
80	108.0	358	1.349	13.5
70	90.2	300	1.296	13.0
30	33.6	110	1.112	11.1

The density figures may be affected, of course, by the purity and the quantity of stabilisers added to the hydrogen peroxide, but the solutions as now manufactured do not contain many impurities and do not require excessive quantities of stabilisers so that the densities should not differ very much from those given.

The freezing point of hydrogen peroxide solutions depends upon the concentration and it is of importance to know its value should it be required to be used in extremely cold climatic conditions. Perhaps the most acceptable results are those of Giguère and Maass,¹¹ whose figures for higher strength solutions are given in Table 4.

TABLE 4.

H ₂ O ₂ per cent. wt/wt.	Freezing point °C.
100	— 0.89
90	— 11
80	— 23
70	— 39.5
30	— 25

The vapour pressure of solutions of hydrogen peroxide has been determined by Giguère and Maass;¹² the figures in Table 5 were determined in our laboratories. This table shows that solutions of high strength hydrogen peroxide are hygroscopic and, in fact, under normal conditions in this country, solutions of 30/40 per cent hydrogen peroxide may also absorb water.

TABLE 5.

H ₂ O ₂ per cent. w/w	Vapour Pressure at 15 C. mm. Hg.
0.0	12.9 ± 0.1
10.05	12.1
20.25	10.9
30.5	9.8
38.8	8.45
49.65	7.0
60.4	5.45
70.55	4.05
79.7	2.8
90.05	1.65
99.0	1.0

The vapour in equilibrium with the higher strength solutions of hydrogen peroxide contains a high percentage of hydrogen peroxide, as is shown by the figures obtained by Giguère and Maass¹² (Table 6).

Another physical property which plays a part in the application of hydrogen peroxide is the viscosity of the solution. This property has been determined

TABLE 6.

H ₂ O ₂ per cent w/w in liquid and vapour phases at 45°C.	Liquid	Vapour
	15.7	0.9
	32.6	1.7
	43.5	4.5
	53.6	9.1
	65.3	15.8
	73.9	31.3
	85.1	48.8
	92.4	73.1
	92.7	75.2
	95.2	83.3

by Maass and Hatcher,¹⁰ and Table 7 shows that the viscosity increases slightly with increased concentration, but hydrogen peroxide cannot be considered to be viscous at even the highest concentration,

TABLE 7.

H ₂ O ₂ Per cent w/w.	Viscosity (18 °C.) Poise
0.00	0.01054
11.21	0.01066
34.05	0.01157
68.50	0.01285
83.15	0.01300
89.47	0.01301

Of the other physical properties, mention may be made of the following:

The specific heat at constant pressure of 100 per cent H₂O₂ liquid is equal to 0.579 cal. per gram.¹⁰

The boiling-point of 90 per cent H₂O₂ is of the order 140°C.

The surface tension varies only slightly with concentration and according to Maass and Hatcher,¹⁰ is equal to 75.67 dynes/cm. for 90.66 per cent solution.

Stability

The stability of hydrogen peroxide, particularly the high strength material, is obviously of paramount importance. The subject is more complex than may be considered at a first glance, since the stability is affected by a number of factors, two or more of which may be operating simultaneously.

The main factors which affect the stability of hydrogen peroxide solutions are as follows:

(a) The purity of the solution as judged by the presence of positive catalysts in solution.

(b) The decomposition due to the reaction at the surface of the containing vessel.

(c) The photochemical decomposition. matter in suspension.

(d) The acceleration of the decomposition by increasing temperature.

(e) The photochemical decomposition.

The first of these factors is probably the best known cause of decomposition. The most active catalysts are certain cations, although with some pure solutions the presence of relatively large concentrations of anions also deteriorates the stability.

Of the cations which have a pronounced de-stabilising effect on hydrogen peroxide the most active are iron, copper and vanadium, while nickel, chromium, manganese and certain others have an appreciable effect, although not so marked as the first three mentioned.

In the most active group, the activity of the catalyst is measurable down to quantities of the order a few parts per 10 millions and even a few parts per 100 millions. It is doubtful whether solutions containing these minute traces of active catalysts can be sufficiently stable without addition of certain other substances known as stabilisers; or negative catalysts.

The actual mechanism of the decomposition by these positive catalysts is not completely understood, but it is significant that cations with more than one valency usually have some degree of activity.

There are certain cations, for example those of the alkali metals, sodium and potassium, which appear to have little or no effect on the stability of the solution and under some conditions, certain cations are even said to have stabilising properties. Further, it should be remembered that probably the most important stabiliser or negative catalyst is the hydrogen ion, while one of the most active destabilisers or positive catalysts is the hydroxyl ion.

It is usual for anions to deteriorate the stability unless present in relatively large concentrations and, in presence of excess H⁺ ions, i.e. relatively high acid solutions. Some anions are stabilising substances, i.e., phosphates.

The second cause of decomposition is that due to the heterogeneous reaction, i.e. the decomposition which takes place on the surface of the containing vessel. The degree of decomposition on surfaces differs considerably with the composition of the surface, i.e. type of material and also the condition of the surface. Some materials are more active than others in promoting decomposition; a smooth surface is generally less active than a rough surface.

The amount of decomposition is related to the area of the surface, and therefore it is usual to express the decomposition in terms of H₂O₂ decomposed per unit area in unit time at a standard temperature.

(To be continued)

REFERENCES

- ¹ B.P. 590,439.
- ² Matheson & Maass, *J.A.C.S.*, 1929, 51, 674.
- ³ To be published in the *Journal of the Institute of Chemical Engineers*.
- ¹⁰ Maass and Hatcher, *J.A.C.S.*, 1920, 42, 2548.

Reinforced Aluminium

An ex-officer of the Italian army, Gino Pellegrini, has invented a new product which he calls "reinforced" aluminium. It consists of fusing a steel network or a similar structure into aluminium. Aluminium sheets thus prepared are said to possess a strength equal to that of some grades of steel. Given the great range of the possible applications of the new product and the fact that Italy has high capacity for the production of aluminium, it presents considerable advantages for the country. The cost of "reinforced" aluminium is stated to be 35-50 per cent of that of steel.

American Chemical Notebook

From Our New York Correspondent

A NEW method to identify and to determine quantitatively the synthetic estrogens has been worked out by Dr. Sidney Gottlieb of the Food and Drug Administration, Federal Security Agency, Washington 25, D.C. (*Journal of the American Pharmaceutical Association, Scientific Edition*, 36: 379, 1947). Since the synthetic estrogens were accepted in therapy, many derivatives of the 4,4 stilbenediol series have become available. This development has brought a need for a reliable and widely applicable method for chemical determination of synthetic estrogens. He reports a method that depends on the formation of nitrosophenols from diethylstilbestrol, hexestrol, dienes-trol, benzeztrol and Meprane. The procedure distinguishes individual estrogens among this group of compounds and determines each compound quantitatively. The presence of the natural estrogens, estrone and alpha-estradiol, does not interfere with the determination.

* * *

What appears to be a very thorough and authoritative presentation of problems in die-casting and of the characteristics and applications of various die-casting alloys has been issued by Federal Metals Division of the American Smelting & Refining Company, 120 Broadway, New York 5. "Die Metal for Better Diecastings," offers an informative exposition of the nature of die-casting, diecasting processes, the selection of alloys, general metallurgy of alloys, effects of impurities, the melting of the metals, and many other essentials. There are also tables of specifications, a chart on composition of steels for dies, and a table of dimensional and weight limits for diecasting of various alloys.

* * *

The Igard Corporation of America, 146 East 35th Street, New York City, has been established by the Combined Optical Industries, Ltd., of London, to handle American sales of plastic ophthalmic lenses and other optical products manufactured by the parent British company. The lenses will be marketed in all regular prescriptions through dispensing opticians to the public and also will be available for industrial safety goggles. The lenses are said to be unbreakable, lighter than glass, and capable of resisting the "fogging" commonly associated with ordinary eyeglasses. Mr. Gordon F. Ives, formerly manager of the import division of Westinghouse Electric International Company, is president of the new corporation.

The Nelson L. Davis Company of Chicago, designers and suppliers of coal processing equipment for F. H. McGraw and Company, constructors and engineers, has developed a new coal cleaning process which, it is claimed, will separate metallurgical coal from steam coal. The process is reported to separate the two types of coal by means of a sink and float principle. According to Mr. Clifford S. Strike, president of the McGraw organization, the new process will mean a considerable saving to coal producers and an even greater saving to steel makers because of the reduction of sulphur which eventually gets to the blast furnaces.

* * *

Indications are that the available supply of steel for the fourth quarter in the United States will be about 10 per cent less than in the third quarter, and supplies may be further reduced after October if conditions warrant such action. Scrap is short, and most mills feel they have insufficient supplies on hand for the winter, when gathering, processing and grading are often restricted by the weather. Representations have been made by the American authorities in Germany that an agreed price should be paid by both Britain and the U.S. for the German stocks of steel scrap acquired, following the expression of belief by U.S. Government officials that \$26 a ton is enough, whereas Britain was thought to be willing to pay as much as \$30 with a view to expediting delivery.

* * *

The U.S. and Britain have been tentatively allocated 240,000 tons each of scrap from Germany for the last six months of the fiscal year ending June 30, 1949, and a total allocation of 420,000 tons has been set for other Western European countries. This scrap, in the form of ruined Nazi equipment, such as bridges, tanks and building frames, is needed by American steel mills to step up their output. An American Government and industry committee, recently returned from a tour of Germany, estimated that up to 10 million tons of steel scrap were available in the Western zones.

* * *

The Mexican Gulf Sulphur Company, of New York, have entered into an agreement with the Jefferson Lake Sulphur company to explore further and develop the former company's sulphur properties in Mexico. Four wells are to be drilled, and next year one of the Jefferson Lake sulphur plants, capable of producing 1500 tons daily, will be re-erected in Mexico.

Metallurgical Section

4 September 1948

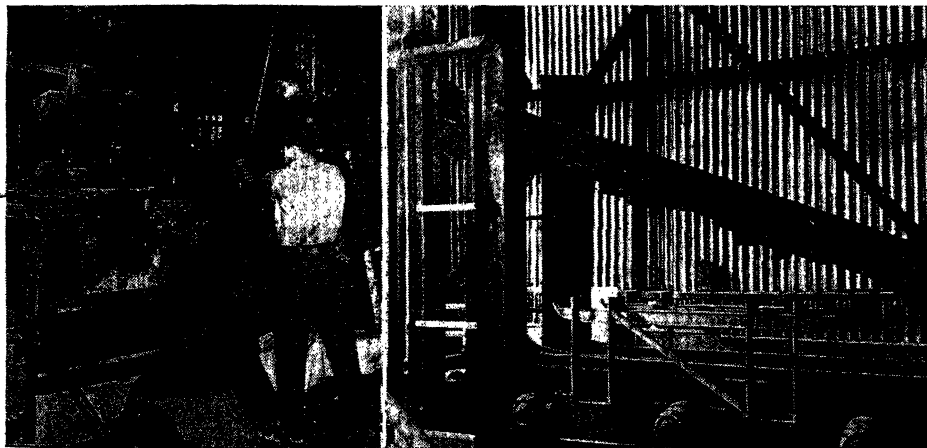
THE CONTINUOUS CASTING OF STEEL Semi-Finished Shapes in One Machine Process

THE idea of cast steel articles being made from the liquid phase to semi-finished shape in one simple, relatively inexpensive machine, has been brought to reality through a joint development of the Republic Steel Corporation and the Babcock and Wilcox Tube Company, both firms announced recently. Plans to licence other steel companies to use the newly developed machine, which allows molten steel to be cast into semi-finished shapes without resorting to ingots or blooming mills, are being completed by the Babcock and Wilcox Tube Company, co-discoverers of the process.

In disclosing the new development, both companies said that the continuous casting of semi-finished steel, now made possible with the new method, would open up possibilities of the utmost importance to the entire steel industry through increasing productivity and decentralising production by simplification of apparatus and increasing the final yield of steel from the original melt. The new method and apparatus are considered a timely response to great economic pressure to serve areas locally.

The greatest single advantage of this process, according to the announcement, is that it removes from the conventional process of steelmaking the most massive and expansive parts of the plants, such as equipment for ingots, soaking pits, and the blooming mill. Instead, continuous casting permits passing directly from the melt to semi-finished sections ready for secondary mills, with the result that not only is the capital cost for a given output greatly reduced, but also maintenance and operational costs. The work accomplished to date makes it clear that for the production of relatively small quantities of steel, and particularly as a means of decentralising steel production, this new development exactly fills the requirements of low capital and low operational costs.

The Republic Steel Corporation first attacked the problem of continuous casting of steel some six years ago, and for several years now the participants in the new development have been casting experimental runs of carbon and alloy steel billets. In March of this year, the first continuously cast steel for conversion into commercial



Molten steel from a standard electric furnace is conveyed to the top of a tower and transferred to an induction furnace, (left—"Iron Age" photo); the cradle in which the formed billet is received at the base of the tower

products was made at Beaver Falls, Pennsylvania. Forty-five tons of 0.15 C steel was shipped to a commercial user. More recently, continuously cast slabs have been rolled into strip. This strip has been converted to electric-welded boiler tubes meeting all of the physical requirements of the company's regular product.

Although continuous casting of non-ferrous metals has been routine industrial practice for the past ten years, when attempts were made to apply the process to steel the problems were multiplied. The metal temperature is far higher and the erosion, segregation, slag inclusion and safety factors are constantly present and very troublesome. The Beaver Falls unit of Babcock and Wilcox has solved these factors in a relatively simple piece of equipment, and it is to be expected that the steel industry eventually will find continuous casting as much an essential part of its operations as does the non-ferrous industry.

Production Methods

At present the Beaver Falls unit casts two or three times per week, handling both carbon and alloy steels. A section of about 30 sq. in. has been used in this work and is satisfactory for commercial use at a rate of 400 lb. a minute. It is expected that continued work on this section will add considerably to the rate. A mould for cross-section of about 45 sq. in. is now under construction. This unit is located at the top of a 75-ft. tower, to which steel is delivered from the company's regular electric furnaces and is lifted to the top of the tower in a transfer ladle. There it is poured into an inductively heated holding and pouring ladle. By watching the liquid steel in the mould by a mirror arrangement, the operators can see at all times whether the liquid surface is clean and the process functioning properly. Shortly after the shell of the billet has been formed, the steel contracts and in so doing the billet shrinks away from the mould. The metal, therefore, is in contact with the surface of the mould for only a few inches, and only in this short distance can it lose heat to the mould by direct contact.

Proper cooling of the mould is essential and its importance increases as the casting rate is raised. The more rapid the casting rate, the greater the quantity of heat which must be absorbed by the surface of the mould. It was found that a number of metals performed almost equally well as a mould material. The Babcock and Wilcox Tube Company has used 1-16 in. steel, $\frac{1}{4}$ in. copper and 3-16 in. brass. It has been found that brass has definite structural and fabrication advantages.

Since continuous casting requires a slag-

free steel, the steel is poured from the holding furnace into a tundish designed to strain out the slag. From the tundish the steel flows into the mould. A pre-heated tundish has been used, but a specially designed electrically heated one will be installed. Below the mould, the casting passes through an insulated chamber which arrests and controls the speed of further cooling. Below this chamber is the withdrawal mechanism regulating the speed of movement of the steel billet. The casting then passes an oxy-acetylene torch which travels down the billet a short distance while the billet is being cut to specified length, which can be as much as 35 ft. The cut-off section of billet is lowered to a horizontal position by a cradle arrangement.

Results at Beaver Falls have indicated that ovals of special properties are the most practicable cross-section to cast continuously. These ovals will readily go into a rolling mill for shaping into rounds, or can be rolled into flats. Continuous casting meets fully established criteria of sound steel making practice, it was stated, and has certain advantages over the conventional method. It allows faster cooling, which results in a fine and uniformly crystalline structure with very little segregation. It offers less opportunity for dirt or other foreign material to enter the castings and, in general, the surface of the ingot will be freer of checking and scabs, and its interior free of entrapped slag.

Flexibility of the heat withdrawal pattern makes it easier to solidify the steel in the mould progressively from the bottom to the top. Although the mould is of uniform cross-section it approximates in behaviour the big-end-up mould—the type used for best quality steels. Ingots made by this method are cooled quickly and therefore tend towards a fine grain rather than a columnar crystal structure. The billets may be as long as desired and have no taper.

Substantial Saving

Babcock and Wilcox and Republic Steel Corporation spokesmen estimate that the new process will provide savings of at least \$3 a ton in the production of steel and will increase production substantially. The special machine, still unnamed, was termed a device "big enough to put into an ordinary family garage, in contrast to the tremendous equipment" it is capable of replacing. While no estimate of the cost of the new machine was given by the inventors, the companies said that such cost was "only fractional" compared to the amount that now must be spent to equip a steel mill.

Emphasising the importance of the new process to smaller communities having a

need for steel products, spokesmen of the companies said:

"Some time in the near future, when the present abnormal demand for steel subsides and prices are deflated, there is going to be a great dislocation of industry in this country, for the simple reason that abandonment of the basing-point method of steel sales will not allow competitive sales of steel in localities far removed from the producing areas. Steel companies, because of the necessity to refrain from freight absorption, will not be able to compete in distant markets and will sell only in their own areas. That would mean that consumers would have to cluster around the steel areas or the steel industry would have to decentralise, building plants throughout the country. With this new continuous casting mould, however, steel companies will be able to move—to move into towns like Dallas and Seattle and other places which are too small to sustain a large and completely integrated steel mill under present conditions."

Licence Facilities

In disclosing plans to license other steel companies to use the new machine, Isaac Harter Jr., plant engineer of the Babcock and Wilcox Tube Company pilot plant, at Reaver Falls, Pa., said that this would be done when experimental work on a larger casting has been completed. Mr. Harter said he was unable to say when the work would be finished on the larger casting, which will have a 45-sq.-in. cross section. Success with a 27-sq.-in. casting was the basis for the announcement of the new process made recently.

JAPAN'S FERRO-ALLOY INDUSTRY

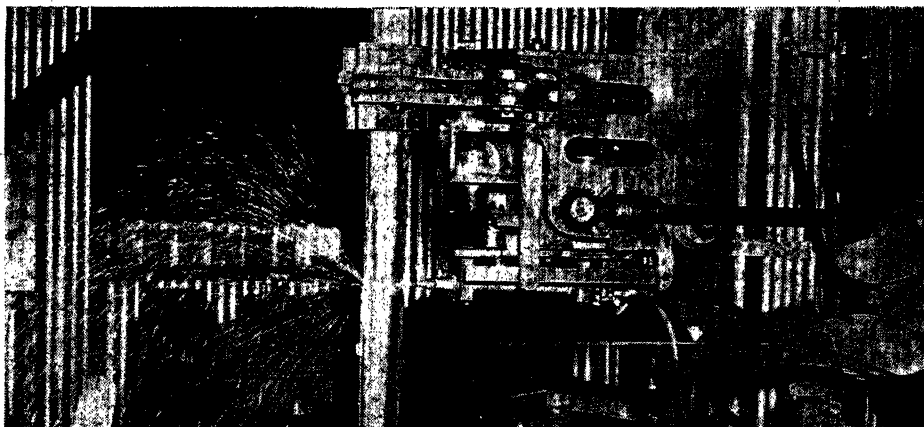
JAPAN'S domestic ferro-alloy industry, which closed down completely after the surrender, and which was re-started in 1946 on a reduced scale, is described in a 52-page publication issued by the U.S. Bureau of Mines. The industry, which reached its peak after Pearl Harbour, was developed in the 'thirties to supply Japan's rapidly expanding steel industry.

Although deficient in iron ores and other mineral resources, Japan established a large and important iron and steel industry between 1931 and 1943. As an integral part, production of special alloys and ferro-alloys also was expanded for use with various grades of steel. In 1940 and 1942, ferro-alloy production reached the record figure of 144,000 metric tons.

Before 1931, ferro-alloys required in Japanese steels were obtained chiefly by imports. During the later years of war and foreign conquest, the industry grew rapidly. At its peak, about 85 plants using more than 340 electric furnaces regularly were smelting 14 different basic ferro-alloys. Steel ingot production also underwent phenomenal development from 1.9 million tons in 1931 to 8 million tons in 1943.

The decline of the Japanese ferro-alloy industry started in 1942, and culminated in the closing of all ferro-alloy plants at the time of the surrender on August 14, 1945.

Six months later, several plants re-opened and by the autumn of 1946, about 22 plants were in partial operation.



As the lower end of the freshly cast billet reaches the bottom of the tower it is cut to any required length by oxy-acetylene flame

Non-Ferrous Metals in Western Germany

Production and Imports Still Inadequate

THE production index for the non-ferrous metals industry in the three Western occupation zones of Germany last year was under 25 (1936 = 100), coal mining was 65, machinery 45, and the general index stood at 39. These figures illustrate the decline in the German non-ferrous metal industry. Redistribution and destruction in war and the changes enforced by zonal barriers since the occupation have all contributed in changing the pattern of German production pre-war.

Compared with the distribution of enterprises in 1938, the British zone has recently had the leading percentage (53.7) of ore mining establishments, followed by the U.S. zone, 20.6; the Russian zone, 16.4; and the French zone, 0.6. The new Polish territories to the East of the Elbe-Neisse line account for 9.7 per cent.

The British zone also has the largest share of metal working plants, 42.1 per cent, followed by the Russian zone, 35.1; the U.S. zone, 15.0; and the French zone, 6.5. Only 1.3 per cent of metal plants are said to be in the new Polish territories. The Russian zone, however, has the largest number of metal goods producing establishments, viz., 47.3 per cent, and the British zone occupies the second place with 24.3 per cent; the U.S. zone possesses 22.0 per cent and 5.6 per cent of the metal goods producing plants are now within the French zone. Poland controls only 0.8 per cent. Although these figures have to be read against the background sketched above, they provide, nevertheless, a useful picture of the basic zonal distribution.

Because large deliveries from the works in the Russian zone are not now possible, the Western zones are forced to supply their requirements from their own plants. War-time destruction has in most areas limited output less than has the lack of ores and skilled labour. Imports last year totalled 4500 tons of aluminium (99.5 per cent), 3100 of electrolytic copper, 180 tons of nickel and 240 tons of tin. All these figures are reported to be considerably below the level of imports envisaged by the British-American authorities.

The following table gives figures for the production of non-ferrous metals in the Bizone in 1947, as compared with the targets and the 1938 production (in tons):—

	1947		1938	
	Tons	Output	Target	Tons
Electro-copper...	18,000	25,000	61,000	61,000
Refined copper	15,850	35,000	209,000	209,000
Zinc	20,800	58,000	136,000	136,000
Lead	24,800	46,000	171,000	171,000
Aluminium	11,000	25,000	101,000	101,000

Output of electrolytic copper in 1947 showed a threefold increase over 1946, chiefly as a result of the resumption of work by the Nordische Affinerie, Hamburg. Output aggregated 18,333 tons, against 6044.

Special attention has been paid to the production of aluminium, the resumption of which has recently been permitted on a limited scale by General Clay. It is reported that the Töging works were taken off the U.S. list of plants to be dismantled and it is hoped to increase monthly output in the three works Töging, Lünen and Rheinfelden.

NEW BONDING PROCESS

A LICENSING agreement has been concluded between the Fairchild Engine & Airplane Corporation, New York, and Wellworthy Piston Rings, Ltd., Lymington, Hampshire, whereby the latter has received an exclusive licence in the British Isles covering use of Fairchild's Al-Fin process for bonding aluminium to iron, steel, and other metals. In announcing the agreement, the chairman of the Fairchild Corporation said that the contract represented the fourth licence granted for the Al-Fin process in recent months and the first foreign licence. In addition to receiving the rights to manufacture and sell bonded bi-metallic products under the Al-Fin process patents, Wellworthy may sub-license the process to other manufacturers.

COMBATING CORROSION

PRESENTED originally to the Institute of Petroleum, a paper by Mr. B. B. Morton on "Metallurgical Methods for Combating Corrosion and Abrasion in the Petroleum Industry" has now been reprinted by the Mond Nickel Co., Ltd., as one of their standard publications. This booklet contains a wealth of data relating to the use of such materials as stainless steels, Monel, K Monel, Inconel, non-ferrous alloys, alloy cast irons, and comprises 68 pages of text, incorporating 33 figures and 39 tables. Although of direct interest chiefly to plant engineers and metallurgists in the petroleum industry, some of the data presented is likely to be of far more general use.

ADVANCE OF POWDER METALLURGY

Further Papers Presented at Graz

From a Special Correspondent

SEVERAL of the more important papers given at the first International Powder Metallurgy Conference held recently at Graz, were reviewed in THE CHEMICAL AGE of August 7, and the following is an account of the remainder of this year's outstanding event in the powder metallurgy world.

On the academic side more than one speaker dealt with work that originally had nothing to do with metal powders. For instance, Professor Kofler, of Innsbruck, demonstrated by means of a film running 15 to 20 minutes the actual phase changes that occur during the sintering of organic powder mixtures having melting points in the region of 100-150°C. The technique was to use a hot-filament microscope with crossed nicols and a time-speed arrangement. While experimental difficulties would be greatly increased if this work were to be duplicated with metal powders, it was thought cinemicrography might well prove useful on some future occasion.

Cohesion Measurement

Another paper, by Professor A. Smekal, was concerned with the initial reaction between solid phases. Groups of exceedingly faint scratches were made on glass and methyl methacrylate resin. The tensile forces set up amounted to 600 tons per sq. in. for the glass and 60 tons per sq. in. for the resin, and it was found that close agreement existed between these values, the magnitude of the chemical valence forces and the mechanical equivalent of the heat evolved. This meant that the magnitude of chemical cohesion in areas below 1 micron could be estimated by a mechanical test. The scratches were made with an alumina tool. In the case of glass, the temperature at the point of contact exceeded 700°C., i.e., the eutectic temperature of the system $\text{Na}_2\text{O}-\text{SiO}_2-\text{Al}_2\text{O}_3$. It followed, therefore, that solid phase reactions are initiated by pressure resulting in a liquid or plastic interface.

The sintering of metal powders was dealt with in a paper by W. E. Kingston, of New York, as previously mentioned. This could not be discussed as the author was not present. It contended that self-diffusion determines the state of the powder from its manufacture onwards, its consequent behaviour during pressing depending on these two factors, also its behaviour during sintering.

In the section devoted to hard metal, the current generic term in this country

for all cemented carbides, British interest was shown by the presentation of five out of nine papers. E. Trent read a contribution from the A.C. Wickman staff which should prove extremely interesting to any carbide manufacturer. It explained fully how the various types of defect occur either during manufacture or as a result of slight variations in the raw materials.

Substituting Tungsten

In addition to this paper and the two papers by A. G. Metcalfe and L. D. Brownlee reviewed last month, there was a full account by R. Kieffer and F. Kölb on their titanium carbide work. As a substitute for tungsten carbide, which, it was thought, will probably always be the most important material in this field, the Germans developed during the war compositions based on titanium carbide, the authors stated. The Metallwerk Plansee concentrated largely upon $\text{TiC}-\text{Mo}_2\text{C}$ and $\text{TiC}-\text{VC}$. The problem of grain size measurement was discussed by P. W. Penrice, who took X-ray photographs with controlled rotation of the specimen and then evaluated the grain size from the line thicknesses. An extended discussion, which followed, on the economics of X-ray control methods was far from conclusive, and other methods such as magnetic saturation measurements also received adequate attention.

Light alloy powder metallurgy was represented by two papers. One by R. Müller and collaborators reported the making of iron-magnesium, iron-calcium, and iron-calcium-aluminium compacts, but these products were said to have so far no industrial use. Work by E. Nachtigall on aluminium-graphite contact elements formed the subject of another paper, but the suggestions for combining aluminium with carbides, diamonds, graphite, alumina, etc., have still to be realised, it was thought.

The session on the Manufacture of Metal Powders was noteworthy for two papers on the D.P.G. disc process by H. Timmerbeil and R. Rapatz, and it was interesting to compare German and Austrian experience in this connection. The Austrians (represented by R. Müller) also described some war-time work on the electrodeposition of copper-lead and cadmium-copper alloys which were used at the time for surfacing iron bearings. This process could well form a source of supply for special alloy powders, the authors suggested.

ELECTROLYTIC METAL POLISHING—I

Some Bases of Current Processes

IT is almost axiomatic that when a basic principle finds new applications they frequently become so numerous and conspicuous that those who laid the foundations are likely to be overwhelmed and forgotten amid the glories of the superstructure.

In the sphere of electrolytic polishing of metals it is desirable to recall the names of Davy and Faraday (see "Davy-Faraday Exhibition in Paris," page xxx), the English discoverers of the basic principles, as our own country does not appear to be very strongly represented in the comparatively new polishing developments which, literally and figuratively, have added such brilliance to this branch of science and industry.

French Pioneer

Most of the credit for contemporary developments has been given to a young Frenchman who, in 1929, discovered an electrolytic method of polishing nickel sheet without mechanical aids. Dr. P. A. Jacquet obtained his degree in 1931 and became one of the chief pioneers in this field. Others for whom this honour, or a share of it, has been claimed, for independent and almost simultaneous similar discoveries, are Drs. C. L. Faust and H. A. Pray, of the Battelle Memorial Institute, Columbus, Ohio, U.S.A.

From the work of these pioneers and others has grown one of the most important and interesting branches in applied physics, micrometallurgy, and general engineering. It has proved abundantly fruitful both in theory and practice. On the purely scientific and theoretical side the study of surface phenomena has been raised to new heights, and on the practical side it has, in recent years, formed the subject of many congresses and symposia, including, for example, the 3rd International Congress on Electrodeposition in London, in September last.

Another important recent congress on surface study—although electro-polishing did not figure very prominently there—was that held in Brussels in January last year by the Société Belge des Mécaniciens, whose proceedings have just been published under the title *Journée des Etats de Surface*.

Papers were contributed here on another great aid to surface study—the electron diffraction microscope—notably by Prof. G. I. Finch, of the Imperial College of Science, with an introduction by Prof. Omer Goche, Brussels University.

It is probably correct to say that these two relatively new factors, electro-polishing and the electron microscope, have become

the most powerful aids in elucidating the many mysteries of surface phenomena and structure in metals and alloys.

With this new method of surface treatment it becomes necessary to define polishing more precisely and to distinguish the electrolytic from the mechanical methods. The former not only imparts a finish which differs in appearance from that obtained mechanically, but, what is much more important, it does not produce any change, stress, or deformation in the surface. The surface remains an exact index and guide to internal structure, both for pure metals and homogeneous solid solutions and for heterogeneous alloys.

With mechanical polishing, however, the presence of impurities and chemical heterogeneities, as well as metallurgical defects, tends to become masked, so that such polished surfaces are no longer a true guide to internal structure. On the other hand, the purely polished or lustrous effect may be produced electrolytically without eliminating the roughness of surface—the geographical peaks and valleys. This is of considerable interest in certain technical or scientific applications.

Further, not only does mechanical polishing mask existing factors but it tends to produce definite changes due to mechanical, thermal, or chemical action. These may include oxidation of the surface, change in crystal form, etc.

Treating Alloys

Although, in electrolytic processes, with heterogeneous or impure metals and alloys, there may persist a certain slight "relief" of surface due to varying rate of anodic solution of impurities or alloy constituents, it is still possible by careful attention to technique to achieve a perfect and smooth polish with such heterogeneous materials. At all events, Jacquet claims to have proved this in respect of lead bronzes. (3rd Intern. Conf.—*Sheet Met. Ind.*, 1947, 24, 2015).

It may seem at first sight, from what has been said about preferential anodic solution and persistence, at least for a time, of some surface irregularity, that electro-polishing is less effective than the mechanical methods for perfect smoothness and dimensional accuracy in precision engineering. It figured hardly at all in the Brussels Congress, where honing was generally the preferred method, as emphasised in papers by British aeronautical engineers (W. E. R. Clay, of Rolls-Royce, Ltd., and F. Nourse, of the Bristol Aeroplane Co.).

It is desirable to recognise limitations of any new development, and to indicate these at the outset. As Samuel Wein says very truly, in two comprehensive papers on the subject of electro-polishing (*Metal Finishing*, February and April, 1948) the method is not universal or capable always of replacing the older mechanical practices.

However, the scope of electro-polishing is sufficiently vast and varied, and the few limitations may be reduced with further study. Its most important application, as already mentioned, is certainly in the physico-metallurgical study of metals and alloys, and especially in micrography (dealt with in a subsequent article). It is evident, too, that it has numerous important and practical uses in metal industry, both from a decorative and protective standpoint.

Stainless Steel

A. P. Schulze, in a series of articles on the fabricating and finishing of stainless steel (*Metal Finishing*, May, 1948), gives ten reasons for using the electro-polishing technique: (1) production of bright finish for sales appeal; (2) impracticable or excessive cost of mechanical methods in some cases; (3) removal of weld scale or discoloration which might cause corrosion; (4) improvement of corrosion resistance—smooth passive surfaces of stainless steel resist border line conditions better; (5) removal of sharp burrs or edges; (6) simplified inspection for quality—seams or irregularities of surface are exaggerated by electro-polishing; (7) elimination of one or more

steps in mechanical buffing; (8) removal of grey film or skin caused by previous operations; (9) improvement of finish of knurled surfaces; (10) better control of size or weight.

These all relate to stainless steel, and it is with this material, i.e., of the 18/8 type, and with nickel silver, that much recent work both in this country and in the U.S.A. has been concerned.

The Mond Nickel Co., Ltd., for example, has developed improved methods for electro-polishing both these materials, some of which were described in a paper by H. Evans and E. H. Lloyd, read before the Electrodepositors' Technical Society last year (*Journal of the ETS*, 1947, 22, 73-84).

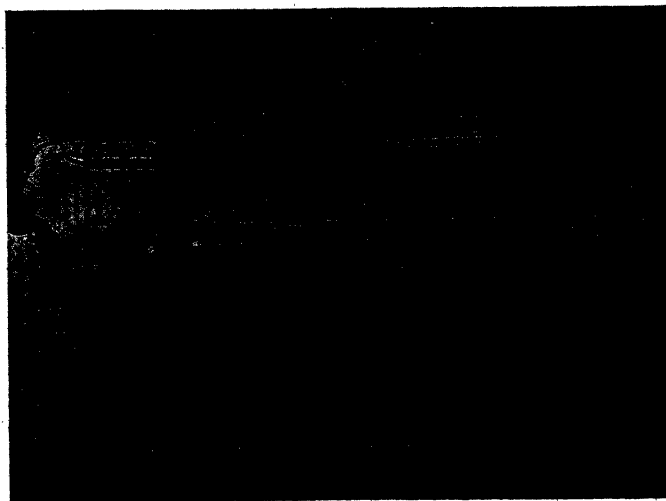
Differing Electrolytes

Very many different electrolytes have been used and proposed for electro-polishing, many of which are quoted by Schulze (*loc. cit.*). In the present usage, however, they were at first limited to about four and eventually to one: (a) perchloric and acetic acids, (b) citric and sulphuric acids, (c) o-phosphoric and sulphuric acids, (d) o-phosphoric acid, glycerine, and water.

The first, though very efficient, has a serious element of danger, although it is claimed this can be almost wholly eliminated with reasonable care. Evans and Lloyd preferred the last for good all-round efficiency and economy. The citric-sulphuric type forms the subject matter of some of the innumerable patents, as in U.S. Patents Nos. 2,331,721 and 2,335,354, in which an electrolyte consisting of 60 per cent citric, 15 per

A 3½ gal. (17 litre) polishing vat in which the water-cooled hollow lead cathodes are placed 6in. apart

(Photograph by courtesy of the Electrodepositors' Technical Society)



cent sulphuric, 25 per cent water, and 4 per cent methanol is protected.

Electrolytic polishing may be defined as anodic in an electrolyte; and, according to Jacquet, Elmore and others, polishing is due to anodic solution of high points on the surface of the material in preference to low points, until a bright smooth surface is obtained.

Such selective solution may be explained by assuming early formation on the anode surface of a viscous protective film, consisting of anodic corrosion products; and its break down at the high points is due to the higher potential gradients there. At the lower points the film, however, remains intact and prevents solution. (See P. A. Jacquet: "Le Polissage Electrolytique des Surfaces métallurgiques," Vol. 1, 1948, p. 70). The filling up of valleys and levelling of hills, presumably can never be quite complete, and it would seem that there is nearly always a certain amount of ripple, visible under a powerful microscope.

Standard Equipment

Equipment generally does not vary very greatly, consisting of a container for the electrolyte, with heating and cooling arrangements, two cathodes opposed in the sides of container, and the article to be polished placed between them to form the anode. The current should be adjustable between 0 and 50 amps. Among the principal factors to be considered are: composition and temperature of electrolyte, current density at the anode, time of operation, and the nature of the original surface.

The best finish was obtained by Evans and Lloyd with an electrolyte consisting of 37 per cent o-phosphoric acid, 56 per cent glycerine, and 7 per cent water, somewhat similar to that used by Uhlig (*Trans. Electrochem. Soc.*, 1940, 78, 265-277). The boiling point of this mixture was 145°C. At low temperatures slightly etched surfaces were obtained on stainless steel spoons, and a very good polish resulted at 100-120°C. Electrical conductivity is higher at such a temperature.

With nickel-silver the optimum temperature was about 60°C. Current density for stainless steel can range fairly widely, but the best results were obtained at 5-10 amp./sq. in. If current density is too low there is slight etching; if too high, the control of temperature is more difficult. Much lower c.d. is suitable for nickel silver than for stainless steel, namely, 1 amp./sq. in. The time required depends, of course, on these factors and possibly still more on preliminary treatment.

Rapid Steel Sampling

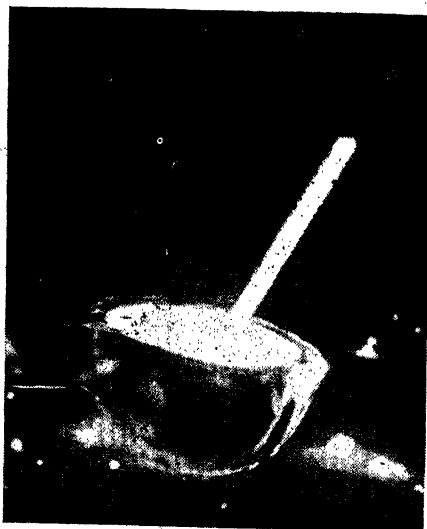
The "Eye-Dropper" Technique

ENGINEERS at the (U.S.) General Electric Company's Schenectady, New York, works laboratory have developed what is colloquially described as an "eye-dropper" method for sampling molten steel at 2700° F. The implement is a heat-resistant glass tube, about the diameter of a lead pencil and 18 in. long, with a rubber bulb at one end. Liquid steel fresh from the furnace is drawn up into the tube by squeezing the rubber bulb, just as an eye-dropper draws normal liquids. The steel hardens into a smooth, homogeneous rod within five minutes, the glass is cracked from it, and the sample rod is ready to be checked for quality.

In a Few Minutes

While older sampling techniques required much time and involved such laborious operations as cutting a block from a hardened steel mass, machining it into a rod, and buffing it to a high polish, with the new technique samples may be prepared for analysis in a few minutes.

Cut in two and fitted into sockets before a spectrograph, the sample forms two electrodes of a high-voltage arc. An electric spark between the two provides spectrographic evidence of the make-up of the electrodes.



Liquid steel being drawn up the resistant glass sampling tube

NEW BERYLLIUM ALLOYS

Five American Patent Applications

FURTHER additions to the range of beryllium alloys for which special claims are made are specified in a series of recent British patent applications, Nos. 6042-6046/1948, in the name of the Allegheny Ludlum Steel Corporation, of Brackenridge, U.S.A.

No. 6042/1948 (Conv. date 28/7/42, U.S.) relates mainly to magnetic steels, for which it is said the chromium steels have not proved entirely satisfactory. In the present invention a small amount of beryllium is included to impart the exceptional magnetic and physical properties desired in magnets and other articles of manufactured steel, including greater hardness and strength and better fluidity when molten.

Carbon content is from 0.1-1.25 per cent, chromium 1-8 per cent, and beryllium from 0.03-0.7 per cent. The alloy may also contain from 0.1-0.5 per cent silicon and manganese, with the usual impurities: phosphorus and sulphur. Properties and test results are described in detail and tabulated.

Patent No. 6043/1948 (Conv. date 28/7/42, U.S.) claims improvements in beryllium-cobalt alloy steels and articles made from them, especially tool steels, die steels, and structural steel. Numerous alloys and treatments have been proposed to give the requisite hardness and other properties.

Principal Constituents

In the present series of alloy steels the principal constituents are: 0.5-14 per cent chromium, 0.1-1 per cent cobalt, 0.05-0.5 per cent beryllium, 0.25-2.5 per cent copper. They are capable of being hardened up to a Brinell hardness of 600, by suitable heat treatment. Carbon content is 0.1-3 per cent. Tables of properties and tests are given. Heat treatments include heating up to 1450-1550°F., followed by air cooling; much lower temperatures than usual are claimed. The composition may also include molybdenum.

Patent No. 6044/1948 (Conv. date 28/7/42, U.S.) claims to afford improvements in chromium-free air-hardened alloy steels and articles made from them, either cast or wrought, especially tools, dies etc. An example is the Mushet type alloy, containing 0.03-0.3 per cent beryllium, 0.25-2.5 per cent copper, 0.5-2.5 per cent silicon, 0.5-2.5 per cent manganese, and 0.75-3.25 per cent molybdenum. Brinell hardness ranges from 600 to 653, and heating temperatures are again low.

Chromium-beryllium alloy steels and products are the subject of Patent No. 6045/

1948 (Conv. date 28/7/42, U.S.). The proposed uses include castings and rolling mill products; and particularly castings for which the usual chromium and stainless steels are not altogether suitable, owing among other things to unsatisfactory fluidity. Intricate and complicated castings are possible. Composition is: 0.5-14 per cent chromium, 0.5-4.5 per cent silicon, relatively small amounts of beryllium, 0.5-6 per cent copper, 0.05-2 per cent carbon, up to 0.5 per cent manganese. These alloys are characterised by high strength, fluidity, and good ductility when subjected to loads suddenly applied.

Covering a similar field is Patent No. 6046/1948 (Conv. date 28/7/42) concerned with beryllium-copper alloy steels and applications.

IMPROVED SURFACE HARDENING

AN improved process for surface hardening is claimed in the British patent application No. 410/1948 (open to public inspection) by Elektriska Svernings A/B, Herkulesgatan, Goteborg.

The method consists of induction heating and subsequent rapid cooling in air or gas until the temperature of the surface zone reaches a pre-determined value, followed by liquid cooling in water. To avoid undesirable structural change in a certain critical temperature interval during cooling—if cooling is below a definite minimum rate exceeding that attainable in a gaseous cooling medium—the article is subjected to liquid cooling as soon as the temperature of the surface zone falls to a value exceeding by a pre-determined amount (e.g. between 0° and 100°) the upper limit of the critical temperature interval.

Chromium manganese steels are subjected to liquid cooling when the temperature of the heated zone has fallen to 400°-500°C. A gaseous cooling medium may be applied during the heating period as well. Quenching may be done in a liquid-gaseous current.

The patent application also describes suitable apparatus.

U.S. Petroleum Prices Coming Down?—

Unconfirmed reports state that one American company has reduced the price of its petroleum and that others are likely to follow suit.

Current Welding Research

New Work by the BWRA

THE annual report (1947-48) of the British Welding Research Association, recently issued, gives much interesting information on the research and work in progress sponsored by the various committees. The activities of the committees and sub-committees on Ferrous Metals (Engineering) are typical. Among these, the actual load carrying capacities of welded steel structures with rigid connections, and the development of rational methods of designing such structures, are being investigated with small-scale frames at the Association's engineering laboratory, Cambridge, and with full-scale frames at its engineering research station, at Abington Hall, Abington, near Cambridge. Then, recommendations for further research on the strength and rigidity of welded structural connections are contained in the full report of work already completed.

Further work on the radiography of welded pressure vessels is to be undertaken, and, with the completion at the Abington laboratories of the installation of testing equipment for carrying out fatigue tests by the resonance vibration method, the investigation into the behaviour of welded structures under dynamic loading are being developed.

Metal Arc Welding

An interesting memorandum which is nearing completion is that on the metal arc welding of butt joints in pressure pipe lines. Research into the stresses in welded pressure vessels is continuing, and attention is concentrated on the measurement of stresses in welded nozzles in a full-scale vessel. The committee on codes of practice for welded building structures has under consideration the preparation of a memorandum on beam and column connections, and also being considered is the need to carry out further research work on the heat treatment of welded constructions.

In connection with the drafting of specifications for electrodes, attention is being given to suitable test requirements for mild steel electrodes of the deep penetrating type. Other investigations are into pipe connections and fittings fabricated by welding, the development of logical design methods, and further tests on seamless and welded pipe bends, and a further memorandum being issued is on faults in arc welds, with illustrations of typical faults in welds of mild and low alloy steels. Still other memoranda in course of preparation are on non-destructive methods for the examination of welds.

Brazing Magnesium

Satisfactory Process Claimed

A SATISFACTORY process for brazing magnesium is stated to have been developed by the Dow Chemical Company, Midland, Michigan, U.S.A., which states that the three commonly used brazing methods—furnace, flux dip and torch—are applicable to magnesium. A flux must be present to free surfaces from oxide or other films to permit capillary flow.

For furnace brazing, the parts to be joined are assembled with pre-placed brazing alloys, fluxed and heated to the required temperature in a furnace. In flux dip brazing, the assembled parts are dipped in a molten flux bath. Torch brazing is similar to gas welding, except that little or no melting of the base metal occurs. It is accomplished by using standard gas welding equipment employing a natural oxy-acetylene or natural gas-air flame.

The brazing process, because of its dependence on capillary flow, especially in furnace and flux dip methods, requires careful design of joints with exact clearance (0.0004-0.010 in.) and adequate placement of filler metal.

Magnesium brazing temperatures are between 1075°F. and 1160°F. Brazing of DOWMETAL M magnesium alloy is commercially practicable, say the company's officials, but brazing for other alloys is still in the experimental stage.

The clean joints resulting from such brazing need little or no dressing, being smooth when completed. Another advantage of the process is that parts too thin to be welded can be brazed. Since both the brazing alloy and the part to be welded have magnesium as their base, the danger of galvanic corrosion is more or less eliminated. In brazing magnesium, however, there is some danger of flux entrapment, which must be guarded against in the gas welding process.

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Home News Items

Signals Research.—The Ministry of Supply Signals Research and Development Establishment at Christchurch, Hampshire, is holding an "Open Day" on Thursday, September 23.

Change of Address.—From September 13, the headquarters of the Export Licensing Branch of the Board of Trade, now at Stafford House, King William Street, London, E.C.4, will be removed to Regis House, which is in the same road. Telephone number: AVenue 3111.

Firemen Prevent Explosion at Tar Works.—An outbreak of fire at the Scottish Tar Distillers Ltd. works, Clark Street, Paisley, last week, involved naphthalene, tar vats and tar barrels. Brigades from surrounding districts were able to prevent an explosion and had the blaze under control in less than an hour.

Danish Exhibition Changes.—The Federation of British Industries has announced the following alterations to the exhibitors' lists for the British Exhibition at Copenhagen this year: the deletion from the Forum Extension group of S. G. Brown, Ltd. (instrument makers and precision engineers) and Electrothermal Engineering Ltd. (thermostats, switches and wires); Chemo-Metals (London), Ltd., has been added to the list of exhibitors at the Gutenberghus.

No Revival of Coal Output.—The prospect of attainment of the 1948 total of 200 million tons of deep-mined coal appeared to recede last week, when mine output totalled 3,740,600 tons, some 21,000 tons less than in the previous week. Production of open-cast coal increased to 218,000 tons. Lord Hyndley stated last week that an average output of 4,170,000 tons weekly would be required to reach the coal target by the end of the year.

Revised British Standards.—The British Standards for three types of portable fire extinguishers—water type, soda acid, B.S. 138; water type, gas pressure, B.S. 1382; and foam type, B.S. 740 Pt. 1—have been revised. The principal object of the revisions is to provide for welded construction in addition to the construction already covered in the original documents. The standards provide full details of the materials to be used, the methods of construction, tests to be carried out on the finished extinguishers and the required markings. Copies are obtainable from the British Standards Institution, Sales Department, 24 Victoria Street, London, S.W.1. Price 2s. 6d., post free.

Physical Chemistry in Pharmacy.—Mr. N. Evers, chairman of the British Pharmaceutical Conference, which began on Tuesday at Brighton, said, in the course of his opening address, he thought the importance of physical chemistry to pharmacists would increase in the future with the multiplication of the raw materials of pharmacy, and with the further study of the mode of action and methods of adsorption of drugs in the human body.

Steel Policy Criticised.—Speaking at a luncheon in Glasgow, last week, Mr. C. D. Rigg, a prominent member of the West Scottish steel trade, said steel production was 2 million tons a year higher than the record pre-war output, yet the shipbuilding industry could obtain only two-thirds of its requirements. The reason appeared to be that the Government did not know where the steel was going. In this country there was no steel consumption analysis such as was compiled by the American Iron and Steel Institute, and without such an analysis neither the Government nor anyone else could plan with certitude and efficiency. It amounted to planning without facts, he said.

Rosin and Turpentine Price Cuts.—As from Wednesday the prices of rosin, turpentine and pine oil sold through the agency of the United Kingdom Naval Stores Association have been reduced. For gum rosin a general reduction of £2 per ton is made in all grades. The price of polymerised rosin remains at 65s. 6d. Wood rosin grade B is reduced by £10 per ton and grades K/M, N/WG and WW by £3 per ton. Grade FF and Vinsol are unchanged. Turpentine prices are revised as follows: American gum spirits, £74 per ton net, naked, and Portuguese gum spirits, £64 per ton net, naked—both ex-U.K. store in loaned drums. Pine oil is reduced to £70 per ton net, naked, ex-U.K. store in loaned drums.

Strike at Petrocarbon Site

Constructional workers employed on the 700-acre site of the new Petrocarbon, Ltd., chemical plant, at Carrington, Cheshire, came out on strike last week after a rigger had been dismissed because he was said to have attended to trade union business without first informing his charge hand.

At first about 250 key men were affected, but they were later joined by more skilled workers and on Tuesday it was reported that nearly 600 men were idle.

TECHNICAL PUBLICATIONS

ANODIC Oxidation of Aluminium and its Alloys" is the title of Information Bulletin No. 14, which The Aluminium Development Association, 33 Grosvenor Street, W.1, has recently published at the price of 1s. The process of anodising being one of surface finishing, this latest bulletin is to that extent related to No. 13: "Surface Finishing of Aluminium and its Alloys." As, however, certain of the finishing processes form a pre-treatment for anodising, separate consideration has been given to the present subject both on the score of logic as well as convenience. The scope of this booklet includes the dyeing of anodised aluminium surfaces and the process of electro-brightening.

* * *

In order to acquaint crop growers with the results of the vast amount of research and experimental work in connection with the use of boron as a fertiliser element, Borax Consolidated, Ltd., has issued Part VI of the series "Boron and Plant Life." This represents a concise collection of widely dispersed information originally published during the period 1936-46, the range of crops also being world-wide.

* * *

A well-produced brochure clearly outlining the activities of the "600" group of companies has recently been issued by George Cohen, Sons & Co., Ltd., for export distribution. Its object is to show firms abroad how this great British industrial organisation can be of service to them.

Entitled *The 600 Group of Companies*, the 130 page booklet is a complete review of all branches of the group and is abundantly illustrated with photographs, diagrams and specification charts. A kindred publication, in condensed form, is being prepared in French and Spanish.

Among the many divisions of the group are those which supply modern secondhand and reconditioned chemical and process plant of all types; plastic moulding, rubber and hydraulic machinery; and new stainless steel equipment.

* * *

A new booklet on Poland and a revised edition of the Portuguese East and West Africa guide in the "Hints to Business Men" series are now available. United Kingdom business men visiting these countries on export business can obtain copies of the booklets from the Export Promotion Department, (Dissemination Section), Thames House North, Millbank, London, S.W.1.

PERSONAL

DR. WILLIAM OGILVIE KERMACK, bio-chemist at the Royal College of Physicians Laboratory, Edinburgh, has been appointed to the new MacLeod-Smith Chair of Biological Chemistry by a meeting of Aberdeen University Court. Dr. Kermack is associated with contributions to the knowledge of synthetic therapeutic compounds, and is the author of several publications and reviews.

MR. JOHN LAMB has relinquished his position as manager of the technical division of the marine department of the Anglo-Saxon Petroleum Co., Ltd., and is to organise and take charge of a new department concerned with marine research and development, with the title of manager of marine research and development, with effect from September 1. Other changes in the marine department include the appointment of MR. A. LOGAN, in succession to MR. LAMB, as manager of the technical division.

DR. W. A. MACFARLANE has been lent by the Ministry of Fuel and Power to the Department of Scientific and Industrial Research for about two years for appointment as director of the United Kingdom Scientific Mission in the British Commonwealth Scientific Offices in Washington. He will also be attache for scientific matters in the British Embassy. Dr. Macfarlane has for the past seven years been director of Fuel Efficiency in the Ministry of Fuel. The present director of the mission, DR. F. N. WOODWARD, is returning to this country towards the end of the year to resume his work as director of the Scottish Seaweed Research Association.

Representatives of the Atomic Energy Organisation of Britain, Canada and the United States are to meet at the Atomic Energy Research Establishment, Harwell, Berkshire, on September 6-8, to reconsider the uniform release of scientific and technical information gained during their combined wartime development of atomic energy. The guide was revised at a conference in America in 1947. The United Kingdom representatives at the conference will be: SIR JOHN COCKCROFT, Director, Atomic Energy Research Establishment, Harwell; Prof. H. J. EMELEUS, University Chemical Laboratory, Pembroke Street, Cambridge; DR. K. FUCHS, Atomic Energy Research Establishment, Harwell; Prof. R. E. PEIERLS, Department of Mathematics, Birmingham University; and Mr. J. H. AWBERY, Department of Atomic Energy, Shell Mex House, Strand, W.C.2.

Overseas News Items

North American Oilseed Crops.—The U.S. is expecting a bumper harvest of soyabean, peanut and oilseed crops this year, and in Canada both the coming linseed crop and the carry-over from last season are far heavier than in 1947.

Shawinigan Company's Power Contract.—Shawinigan Water and Power Company has contracted to supply power to the new titanium smelting plant to be erected at Sorel (Quebec) by the Canadian subsidiary of the Kennecott Copper Corporation. The smelter's first unit, planned to begin full operation in 1951, will require an initial power development of 150,000 h.p.

Patent Office for Bizonia.—The first Patent Office has recently been opened in Darmstadt in the united British-American zone of Germany. Hitherto it has not been possible to register patents in Germany. It is believed that many post-war inventions and developments have not been made public because of the lack of the normal facilities provided by a Patent Office.

Poland's 1949 Output Targets.—The Polish industrial plan for next year forecasts that the total value of the state-owned industry's production will be increased from 21 to 23 per cent over this year's figure. Among output increases expected are: coal, 10 per cent (to 74 million tons); crude oil, 3 per cent; superphosphates, 34 per cent; sulphuric acid, 28 per cent; nitrate, 15 per cent; cellulose, 12 per cent.

South African Uranium.—Speaking in the South African Assembly, the Minister of Mines said the Government had not had time to consider a question regarding steps contemplated to prolong the life of low-grade uranium mines. He added that the extraction of uranium in the terms of the Atomic Energy Bill would doubtless play an important part in prolonging the life of such mines.

Dispersal of I.G.F. Works.—Detailed Allied instructions have been issued by the German Bi-zonal Economics Administration for the dispersal of the factories and other properties of Germany's big chemical combine, I.G. Farbenindustrie, in the British and American zones. The German dispersal panel which must be appointed by the German bi-zonal executive by tomorrow, Sunday, September 5, will work under a special Anglo-American control unit. Holding trustee rights over all Farben properties in the two zones, it will dispose of these to a number of independent firms to be created.

New Dutch Refinery.—A large refinery is being built near Rotterdam for the Caltex Petroleum Company at a cost of between 50 million and 60 million guilders. Work was recently started and is expected to be completed in three years. Part of the refined oil will be re-exported.

Swiss Metallurgy in Argentina.—The Argentine Government has recently given permission to the Kopex Sudamericana S.A., a Swiss enterprise formed with the object of manufacturing flexible metal pipes, to work in the country. It has also permitted the entry of 23 members of the company's technical staff and granted foreign exchange permits.

Increasing Bulgarian Opium Production.—The development of a pharmaceutical industry occupies a prominent place in the Bulgarian two-year plan. In particular, the production of opium is being promoted in the southern part of the country. Output rose from 500 kg. in 1945 to 1300 kg. in 1946 and to 4000 kg. last year. For the current year, a figure of 10,000 kg. is possible.

Hungarian Dyestuffs Group.—With the co-operation of the Hungarian Economic Council and the central organisation for basic products and prices, a joint undertaking has recently been established by the foremost Hungarian dyestuffs producers, having in view the development of exports on a considerable scale at the beginning of next year. In particular, brown and black leather dyes will be shipped.

Italian Copper Sulphate.—Italy has considerable stocks of copper sulphate left over from last year because many consumers possess reserves accumulated when a rise in prices was anticipated and are not purchasing fresh supplies. Present consumption is about 60 per cent of the pre-war total, but it is expected that a spread of peronospora in the vineyards will cause an increase in demand.

Australian Steel Prices to Rise?—Speaking in Sydney recently, Mr. H. G. Darling, chairman of Broken Hill Proprietary Company, forecast a rise in iron and steel prices in Australia. He said that Australian prices were still "pounds per ton" below those overseas, and added that there were no signs of abatement in demand for Australian steel because of accumulated war-time orders, post-war industrial expansion and inability to operate production units near capacity through insufficient coal and labour.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

L. SLACK & SON, LTD., Pontypridd. (M., 4/9/48.) July 21, £2545 charge to A. I. Greatrex, Pontypridd; charged on Bishops-gate House, Courthouse, Pontypridd. *£4650. September 29, 1947.

LEDA CHEMICALS, LTD., London, E.C. (M., 4/9/48.) July 26, mortgage and charge, to Midland Bank Ltd. securing all moneys due or to become due to the Bank; charged on factory at Wharf Road, Ponders End, with machinery, fixtures, etc., and general charge. *Nil. December 31, 1947.

SIMONSWOOD MANUFACTURING CO., LTD., Kirkby, near Liverpool. (M., 4/9/48.) July 23, mortgage, to Middleton & Tonge Co-operative Land and Building Society Ltd., securing £16,000 and further advances; charged on land at Kirkby (formerly Royal Ordnance Factory), with buildings and erections known as 8D37 and air raid shelter.

INTERNATIONAL LABORATORIES, LTD., London, S.W. (M., 4/9/48.) July 3, £1000 charge (sec. 97, 1948 Act), to P. B. Frece, London, and another; charged on certain land and buildings at Fishers Lane, Charlbury, and two cottages, etc., situate corner of Sheep Street and Fishers Lane, Charlbury; also July 3, £620 charge (section 97, 1948 Act), to Mrs. G. Dodd, Birmingham; charged on dwelling house, warehouse, bakehouse, etc., situate Thames Street, Charlbury; also July 3, charge (section 97, 1948 Act) to Barclays Bank Ltd., securing all moneys due or to become due to the Bank from Pickups Ltd., and/or the company; charged on Wyewood House with outbuildings and land adjoining Charlbury. *Nil. May 6, 1948.

Company News

The nominal capital of **Gaedor, Ltd.**, 187 Victoria Street, London, S.W.1, has been increased beyond the registered capital of £100, by £299,900, in £1 ordinary shares.

The directors of **P. B. Cow and Company**, rubber and plastic manufacturers, have

announced that they have acquired the entire issued share capital of **Hertfordshire Rubber Company**, manufacturers of industrial mouldings and extrusion products. They had previously intimated that they propose to increase the company's capital by the creation of 487,000 5 per cent cumulative redeemable preference shares of £1.

Chemical and Allied Stocks and Shares

A BETTER tendency has been maintained in stock markets, buyers coming in on the assumption that international news is likely to take a turn for the better. Buying, although still on a very moderate scale, extended from British Funds to industrial shares, prices responding readily in the absence of selling. Shares of chemical and kindred companies participated. Imperial Chemical, however, eased to 44s. 7½d. being sold in order to exchange into the new, which are a cheaper purchase than the old shares. The new shares will not rank for the current year's interim dividend, but they are free of stamp. The new have fluctuated, and after 3s. 9d. premium eased to 3s. 4½d. premium.

Monsanto Chemicals 5s. ordinary were 57s. 6d., and Laporte Chemical 5s. ordinary units changed hands over 20s. with Fisons at 58s. 6d. and Burt Boulton and Haywood at 26s. Albright & Wilson 5s. shares marked 28s. 9d. and Morgan Crucible "A" ordinary were 55s. at which there is a yield of over 4½ per cent on the basis of last year's 12½ per cent dividend. William Blythe 3s. shares continued more active, changing hands around 18s. 7½d. British Glues & Chemicals 4s. ordinary strengthened to 18s. 3d. At £5, Metal Box shares also strengthened in price, but De La Rue receded to 38s. 9d. although among other shares of companies connected with plastics, British Klyonite were steady at £5. British Industrial Plastics 2s. shares again changed hands around 6s. 10½d. and Erinoid were 10s. 9d.

British Oxygen were better at 99s. 4½d. with British Aluminium firm at 47s. 3d., Turner & Newall 76s. and United Molasses 48s. 1½d. Following publication of the full results, the 4s. units of the Distillers Co. firmed up to 26s. 9d. British Plaster Board 5s. ordinary strengthened to 24s. 10½d. General Electric improved to 85s. 3d. in anticipation of consolidated accounts, while Associated Electrical were 72s. 6d. and Johnson & Phillips 68s. 9d. Dunlop Rubber at 73s. 3d. also moved with the general trend.

Iron and steel strengthened, partly because of the good yields, although the

market view is that the Government is likely to introduce its nationalisation Bill in October or November. It is still assumed that in any case nationalisation cannot be effected for two years. Guest Keen strengthened to 47s. 6d. on the full results and chairman's annual statement, and, following the news that the Bank of England has sold the balance of its holdings of shares in the company, Thomas & Baldwins rose to 14s. 9d. Stewarts & Lloyds were better at 53s. 3d. Staveley Coal & Iron improved to 74s. on the possibility of a special distribution to shareholders, although it is not unlikely that cash and other resources arising from nationalisation of some of the company's activities, will be used to increase its chemical and kindred interests.

Triplex Glass 10s. ordinary units improved to 25s. 9d. Amalgamated Metal were firm at 19s. with General Refractories at 22s. and Boots Drug 52s. 9d. British Drug Houses 5s. ordinary strengthened to 8s. 6d. Beechams deferred were better at 19s. 7½d. with Griffiths Hughes at 31s. 6d. Oil shares were uncertain, Anglo-Iranian fluctuating moderately, but Canadian Eagle attracted on further consideration of the annual report, and the price rose to 33s. 3d.

British Chemical Prices

Market Reports

A STEADY demand and a firm price structure characterised most sections of the industrial chemicals market. No outstanding price movements have been reported during the past week and the overall supply position remains unchanged, with deliveries to the chief consuming industries proceeding reasonably satisfactorily. The demand for pitch and for the coal tar products generally continues on a good scale.

MANCHESTER.—Generally firm price conditions have continued on the Manchester chemical market during the past week and, trading conditions on the whole, have been satisfactory. Soda ash, caustic soda and other alkali products are finding a good outlet among home industrial users and a steady demand is being experienced for the general run of ammonia and magnesia compounds, as well as for a wide range of other lines. Buying interest on the part of shippers has been of fair extent, with parcels sought for export to the Dominion and other markets. So far as the by-products are concerned, a steady trade is being done in carbolic and cresylic acids, cresote oil, pyridine and most of the light distillates.

GLASGOW.—In the Scottish chemical market business has been fairly active again

during the past week. Coal tar products have been well absorbed and the demand for inorganic materials, insecticides and detergents has been well maintained. In the export market, inquiries have been on a much heavier scale than in previous weeks and a number of satisfactory orders have been booked. In general, the volume of business is satisfactory for the time of the year.

MANGANESE STEEL CASTINGS

THE British Standards Institution has recently published two British Standards for manganese steel castings for general engineering purposes:

B.S. 1456 for 1½ per cent manganese steel castings, in which two grades of castings P and R are specified according to the ultimate tensile stress obtained from the test piece. The chemical composition of the steel is specified and test requirements relate to the tensile and impact tests. Provision is also made for non-destructive tests and hardness test after heat treatment where required.

Details are included of process of manufacture, fettling and dressing, freedom from defects, provision of test samples, testing facilities, branding and repairs to castings. Appendix A gives recommendations with regard to welding procedure.

B.S. 1457 for austenitic manganese steel castings in which the chemical composition and heat treatment of the steel is specified. Test requirements relate to a hardness test and, where required, a bend test may be called for by the purchaser. The same additional data as for B.S. 1456 are given.

Copies of these standards can be obtained from the British Standards Institution, Sales Department, 24 Victoria-street, London, S.W.1. (2s. each post paid.)

Hungarian Aluminium Plan

Although Hungary is a leading European producer of bauxite, the country's output of aluminium and aluminium goods is very small. Before the war, Hungary exported most of her bauxite to Germany, but the new three-year-plan for industry provides for the extension of existing aluminium plants with a view to ensuring self-sufficiency and establishing an export trade.

The plant at Almasfüzito, which had a pre-war capacity of 7000 tons, is to be enlarged to produce annually about 100,000 tons and the aluminium foundries at Felsőgalla and Ajka are also to be expanded. The industry's technical problems will be investigated at a special research laboratory which has recently been opened at the Budapest Technical Institute.

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2, at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Nitrogenous fertilisers.—Imperial Chemical Industries, Ltd., W. Tyerman, R. G. Franklin, R. Parmella, and A. H. Lewis. Jan. 7, 1946. (Cognate Application 35864/46.) 605,829.

Insolubilising treatment of films, filaments, fibres, and like shaped articles made from protein solutions.—Imperial Chemical Industries, Ltd., D. Traill, and A. McLean. Jan. 7, 1946. 605,880.

Process for removing organic sulphur compounds from gases.—Gas Research Board, and A. H. Eastwood. Jan. 7, 1946. 605,888.

Removal of colour from shaped articles comprising a polymer or co-polymer of acrylonitrile.—E. I. Du Pont De Nemours & Co., and J. C. Richards. Feb. 18, 1946. 605,770.

Removal of colour from shaped articles comprising a polymer or copolymer of acrylonitrile.—E. I. Du Pont De Nemours & Co., and R. A. Schneiderbauer. Feb. 18, 1946. 605,771.

Manufacture of long chain carboxylic acids.—E. I. Du Pont De Nemours & Co. March 17, 1945. 605,848.

Manufacture of long chain carboxylic acids.—E. I. Du Pont De Nemours & Co. March 17, 1945. 605,849.

Process for the manufacture of pentaenes.—Roche Products, Ltd. (F. Hoffman-La Roche & Co.). Nov. 5, 1945. (Divided out of 605,208). (Sample furnished.) 605,772.

Process for the manufacture of methacrylamide.—Lonza Elektrizitätswerke und Chemische Fabriken Akt.-Ges. March 21, 1940. 606,096.

Manufacture of solutions of polyvinyl chlorides.—Soc. Des. Usines Chimiques Rhénopoulenc. April 15, 1940. 606,097.

Production of plastic compositions containing polymers or copolymers of vinyl chloride.—Anglo-Iranian Oil Co., Ltd., E. W. M. Fawcett, and A. Millien. Oct. 28, 1942. 606,099.

Production of complex metal ammine salts.—A. H. Stevens (Albi Chemical Corporation). Dec. 13, 1943. 605,861.

Refining of crude wax obtained from mineral oil.—Steel Bros. & Co., Ltd., A. D. Armstrong, J. Mitchell, A. M. Fraser, and W. H. Chalmers. Feb. 29, 1944. 605,936.

Process for recovering cyclopentadiene.—Carnegie-Illinois Steel Corporation. July 17, 1941. 606,112.

Centrifugal governors.—R. W. Phelps and L. T. Rutledge. Feb. 2, 1945. 605,942.

Processes for the polymerisation of vinyl compounds.—Soc. Anon. Des Manufactures Des Glaces Et Produits Chimiques De St.-Gobain, Chauny, & Cirey. Dec. 31, 1941. 606,116.

Process of producing substituted acidines and intermediates therefrom.—E. Lilly & Co. June 29, 1944. 605,870.

Strongly adherent metal coated articles and means for producing the same.—W. H. Colbert, A. R. Weinrich, and W. L. Morgan. June 24, 1944. 605,871.

Method of forming strongly adherent metallic compound film by glow discharge and articles resulting therefrom.—W. H. Colbert, A. R. Weinrich, and W. L. Morgan. June 24, 1944. 605,872.

Method of forming strongly adherent low reflection coatings by glow discharge.—W. H. Colbert, A. R. Weinrich, and W. L. Morgan. June 24, 1944. 605,873.

Method of recovering hard metal carbides and bond metals from sintered masses.—G. J. Trapp. June 7, 1945. 606,117.

Method of forming an oxidised metallic compound coating.—W. H. Colbert, A. R. Weinrich, and W. L. Morgan. June 24, 1944. 605,874.

Process for the production of imino ethers and amidines.—Ward, Blenkinsopp & Co., Ltd., A. A. Goldberg, and W. Kelly. July 11, 1945. 605,952.

Insecticidal coating compositions.—L. Berger & Sons, Ltd., D. H. Hewitt, L. A. Paxon, and J. Roseman. Oct. 17, 1945. 605,960.

Photographic silver salt emulsions containing dyes and processes of producing such dyes.—Kodak, Ltd. (Eastman Kodak Co., L. G. S. Brooker, F. L. White, and G. H. Keyes). Nov. 19, 1945. 606,141.

Co-polymers and process of producing them.—H. G. C. Fairweather, (Mathieson Alkali Works). Dec. 12, 1945. (Convention date not granted.) 606,150.

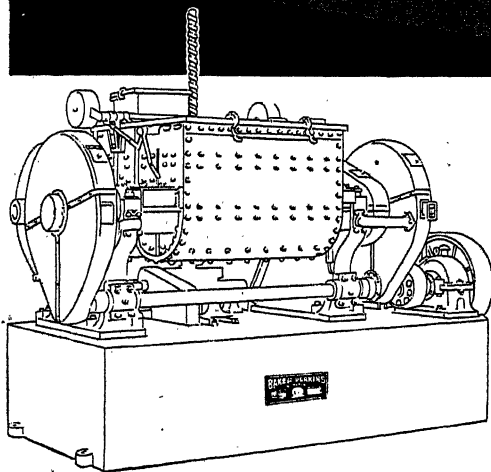
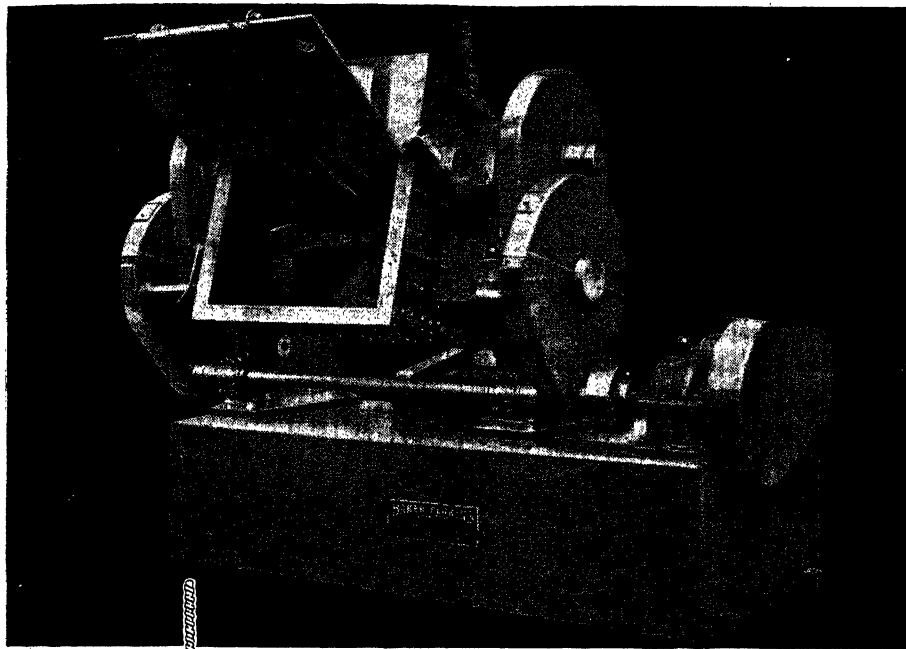
Methods for the production of salts of chlorethane sulphonic acid.—Francais, Etat. Aug. 27, 1942. 605,973.

Manufacture of alkali chlorites.—Solvay & Cie. Feb. 27, 1943. 605,983.

Fuel feeding system for gas turbines.—Bendix Aviation Corporation. Jan. 11, 1945. 605,991.

Manufacture of 1-acetoxy-3-chloropentane-(4).—Roche Products, Ltd., J. A. Low, and R. J. Smith. Jan. 8, 1946. 606,026.

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Process and arrangement for synthesis of tetrachlorethane.—Solvay & Cie. March 15, 1944. 606,035.

Aryl amines and process of making the same.—E. P. Newton (Parke, Davis & Co.). Jan. 8, 1946. 606,037.

Devices for dispersing pesticidal compounds.—Imperial Chemical Industries, Ltd., D. J. Branscombe, and J. Gillies. Jan. 9, 1946. 606,049.

Production of vinyl co-polymers.—Mo Och Domsjo Aktiebolag. Jan. 17, 1945. 606,050.

Hardness testing machines.—Colloidal Research Laboratories, Ltd., and A. E. G. Baring. Jan. 9, 1946. 606,061.

Centrifugal separators.—W. H. A. Thiemann (H. W. Fawcett). Jan. 9, 1946. 606,062.

Degassing and grain refining of magnesium and magnesium base alloys.—Foundry Services, Ltd., and K. Strauss. Jan. 9, 1946. 606,072.

Unsaturated polymeric materials.—United States Rubber Co. March 1, 1945. 606,080.

Manufacture of iron castings.—British Cast Iron Research Association, H. Morrogh, and A. G. Gardner. Jan. 16, 1946. 605,909.

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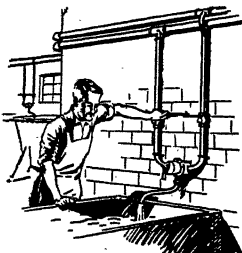
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The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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“The Passing World”

SIR HENRY TIZARD has entitled his presidential address to the British Association “The Passing World,” and in it he has reviewed the achievements of mankind in his own lifetime. Naturally, he has not been content with a survey, but has reflected on what policy should be followed for the future. His advice may be summarised in the words of Carlyle: “Our main business is not to see what lies dimly at a distance, but to do what lies clearly at hand.” There is stimulation in his conclusion: “We live, indeed, in difficult times. But they are very interesting times; and difficulties are bracing to a nation which has not lost the resilience of youth. . . . This is a time for adventure; for taking risks. Calculated risks, of course; but not so nicely or lengthily calculated that they are taken too late.” and he ends by predicting that when many years hence a future president of the British Association “reviews the progress of the nation from the depths of bankruptcy to new and unsurpassed heights of prosperity and influence . . . he may justly claim that the chief cause of the change was that we had found the right way to combine originality in science with enterprise and speed in its application.”

Looking forward with calculated optimism must not blind us to the present difficulties. Sir Henry faces those difficulties and considers how they should be met. It is perhaps not without significance that he is chairman of the Advisory Council

on Scientific Policy, the first report of which we have discussed previously in its association with Government Scientific Policy. The presidential address to the British Association bears evidence of coming out of the same stable, though in many respects it discusses matters with which that report could not deal.

The events of the past have served to quicken the national interest in science. That is common knowledge. Sir Henry recalls the shock caused by the exposure of our industrial short-comings during the first World War, which had been concealed by the apparent prosperity of previous years, and which led to events which must surely find a place in the history-books of the future; as a result, after that war “ . . . there was a surge of discovery which put Great Britain in the van of progress in nearly all branches of science. We became a scientific nation. . . . The chemical industries took on a new and active lease of life.” In spite of this, we have failed to keep our place among the great industrial nations of the world. Why?

The reason, in Sir Henry's view does not lie in failure to carry out sufficient research. His conclusion is that reached also in the Advisory Council's report, namely, that what is lacking is the application of existing knowledge. The productivity of labour is far lower than it could be if “the results of past research were more resolutely and continuously applied.”

There are two conditions for future

On Other Pages

<i>Leader:</i>		<i>U.K. Chemical Plant in Spain</i> ...	345
"The Passing World" ...	337	<i>Barometer of Chemical Industry</i> ...	346
<i>Notes and Comments:</i>		<i>Diatomite from Skye</i> ...	347
<i>Taxation and Industry</i> ...	339	<i>High Strength Hydrogen Peroxide</i> ...	351
<i>Nothing in the Bag</i> ...	339	<i>A. Boake Roberts in South Africa</i> ...	353
<i>Copenhagen Exhibition</i> ...	339	<i>New U.S. Chemical Plants</i> ...	353
<i>Oil and Chemicals</i> ...	340	<i>J. A. R. Newlands (1837-1898)</i> ...	354
<i>American Model</i> ...	340	<i>Another Aluminium Alloy</i> ...	356
<i>The Paper Censorship</i> ...	340	<i>Industrial Brazil</i> ...	356
<i>Prospects in Copenhagen</i> ...	341	<i>Substitute Sources of Cresylic Acid</i> ...	357
<i>Electronic Instruments</i> ...	341	<i>Scottish Plan to Recruit Technicians</i> ...	357
<i>Chemical Safety Conference</i> ...	342	<i>Chemicals from Seawater</i> ...	359
<i>Smoke Abatement</i> ...	342	<i>Leather Trades Chemists</i> ...	359
<i>Arresting River Pollution</i> ...	342	<i>Synthetic Mica Threatens Indian Industry</i> ...	360
<i>Alleged Factory Nuisances</i> ...	342	<i>A Chemist's Bookshelf</i> ...	361
<i>Chemical Industry in China</i> ...	343	<i>Technical Publications</i> ...	363
<i>New U.S. Wattmeter</i> ...	344	<i>Efficient Water Treatment</i> ...	364
<i>Alsace Potassium Mining</i> ...	344		

success here, and we shall do well to note them both. One is that the nation as a whole shall attain a higher standard in technology—that largely resolves itself into technical education. The other is that the captains and non-commissioned officers of industry, from the board room downwards, shall be technically trained.

The British industries that are now standing up best to the strain of adverse conditions, in Sir Henry's view, are those that most nearly approach this system. "The chemical industries, for example, have gradually developed a similar organisation over the last 80 years. Neither research nor development is neglected, and management is in the hands of men highly educated in pure and applied science. . . . Forty years ago they were inferior to the German industries, now they have little to fear from any competitors." The steel industry has developed along the same lines, and its contemporary achievements, to the chagrin of those who would nationalise it, are second to none. Moreover, Sir Henry asks us to note that "in such industries human troubles, if not entirely absent, are inconspicuous."

This problem of productivity and of the management of industrial undertakings is our most immediate care, but beyond that other problems loom. There was apparent over-production of food in the 1930's.

"Since then," Sir Henry has reminded us, "the population of the world has increased by some 300 million people." He believes that we could increase agricultural production in this country by 20 per cent through the application of known methods, but even so we should still have to import food for 20-25 million people. Meanwhile 20-odd millions are being added each year to the world's population. "Whatever other countries may do, it is our bounden duty, and the only certain method of safeguarding our future so long as we remain a large food importing country, to develop our Colonial territories, particularly the under-populated African Colonies, where the increase in population that would follow the control of disease and the increase of food supply would open fresh markets for international trade." This great task will call for the intensive application of science, in collaboration with other countries."

We live, in difficult times indeed, but as Sir Henry implies, they convey a challenge. The crowding problems, despite all political talk, are basically problems of the application of science—not only of chemistry or physics—but of all the productive and ameliorative sciences. We shall do well to ponder deeply the advice of scientists whose experience of affairs is as wide as that of the 1948 president of the British Association.

NOTES AND COMMENTS

Taxation and Industry

THERE is no doubt that present heavy taxes are slowing down our industrial progress at a time when it should be forging ahead with all possible speed. Many are the complaints directed against the Chancellor of the Exchequer on the subject, but not all are supported by a clear account of the way in which taxation is applying the brakes to industrial expansion and improvement. Such a picture was painted by Mr. Roger Duncalfe, chairman of British Glues & Chemicals, Ltd., in his review at the recent annual general meeting of the company. Industrial progress, he said, demanded the ploughing back of substantial profits in order to finance expanding trade, and to maintain and improve buildings, plant and tools. But under the present remorseless taxation, the build-up of capital within the business was moving too slowly to achieve the speedy resurgence of industry along modern lines. Mr. Duncalfe quoted figures showing that out of every £1 received in the group as trading income, 18s. 6½d. is spent on raw materials, wages, plant maintenance and other production costs, and that of the remaining 1s. 5½d. in the £, 10½d. is absorbed in taxation, 3½d. is retained in the business as additional capital, leaving only 3½d. for the stockholders as dividend. Mr. Duncalfe's figures surely explode the myth about the supposedly "colossal" amount that goes into shareholders' pockets and indicate that speedier expansion of industry is dependent upon an easing of taxation.

Nothing in the Bag

ECONOMIC pressure has been responsible for some strange partnerships, but none, perhaps, more unexpected than the community of viewpoint between Mr. Duncalfe and the Chancellor of the Exchequer, evidenced by some of the unpalatable facts which Sir Stafford Cripps has been imparting this week to the annual meeting of the TUC. It must have needed all his undoubted courage to tear to shreds the legend—which his party has spent years in disseminating—that you can get all your heart desires by the simple expedient of "soaking the rich." Accord-

ing to Sir Stafford that particular Father Christmas now carries a sack too small to satisfy a village choir outing, let alone the requirements of some eight million organised trade unionists. Sir Stafford, having plundered that sack most purposefully himself, should know how little is still in it. "We have only to look at the figures of distributed corporation profits and compare them with the amount spent on wages and salaries to know there is no substantial relief to be obtained from that source," he told the TUC. And, to prove there was no deception, he gave them some "rough estimates" of how earnings were distributed in 1947: dividends (after tax) £320 million; wages, on the same basis, £3260 million; salaries, £1435 million.

Copenhagen Exhibition

SPEAKING at a Press conference in London this week, Sir Guy Locock, C.M.G., vice-president of the Federation of British Industries, referred to the unique character of the forthcoming British Exhibition in Copenhagen in that it really owed its inception to the Danes themselves. It was, he said, being organised by the British Import Union of Copenhagen in co-operation with the FBI and with the approval of H.M. Government and the Danish Government, and was a gesture of great friendliness towards this country on the part of the Danish people. They had taken the initiative in organising an exhibition, which was really chiefly in the interests of Britain. Although the main purpose of the exhibition was the selling of British goods in Denmark, said Sir Guy Locock, the fact must not be lost sight of that if we want to sell to Denmark we shall have to buy from her, and it was his hope that the exhibition would be the means of instigating a two-way trade. Our own view is, that this enterprise deserves all the success that wholehearted co-operation can assure, and it is to be regretted that those responsible for the dissemination of the advance information here have not, as yet, furnished the technical, scientific and trade Press with the sort of information which technicians and scientists require. One hopes,

however, that this omission may still be rectified in time for the Press to do justice to the description of the exhibits of the thousand-odd British manufacturing firms showing at Copenhagen, whose goods, it may be safely assumed, will be truly representative of the technology and fine workmanship for which this country is famed.

Oil and Chemicals

IN their preoccupation with coal, steel, textiles and some other industries conspicuously in the public eye, recent contributors to the lively politico-cum-industrial "symposium" on the prospects of enhanced production in the United Kingdom have preserved silence with regard to one of the youngest and certainly not the least promising of our industries—oil refining. That perhaps is not entirely their fault, having regard to the general paucity of information about what has been achieved in the actual refinery processing and the even more promising off-spring in the chemical field, the potentialities of which are already being evidenced by the increasing availability of some synthetic detergents, wetting agents and similar products. These, however, most certainly do not mark the limits of what can be done when home refining on a large scale is linked with chemical producing plants, and it is tempting to anticipate some of the solid benefits which could accrue when the field is fully developed. Had the technique of petroleum-chemical production been available when the first large-scale British refinery took shape at Llandarcy nearly 30 years ago the history of that project would almost certainly have been very different.

American Model

THERE seems to be very little doubt that economically the conversion of petroleum into higher valued products will ultimately be one of the more important factors in rendering profitable the refining of crude in plants situated some thousands of miles from the nearest sizeable natural source. It is no bad thing that the U.S.A. is simultaneously becoming almost feverishly interested in this and affiliated branches of research (under much more favourable conditions) which it is carrying out on a typically lavish scale

without too much reticence about what it has achieved. Practical experience there has provided many useful pointers, of which the latest was the description to the American Chemical Society in Washington, D.C., of the successful adaptation by the Standard Oil Development Company of the "hybrid" Oxo process to pilot and commercial plant production of higher primary alcohols from petroleum olefins. These appear to be yielding an important and fruitful source of plasticisers essential for the fuller development of vinyl resins and synthetic rubber. Laboratory and commercial evidence is being adduced that these alcohols are effective competitors of phthalate and other types of ester plasticisers. While synthetic rubber production is of relatively small interest here, present indications of other prospective uses, such as paint dryers, wetting agent intermediates and anti-foaming agents, suggest that this could well be another ramification of the growing British petroleum industry.

The Paper Censorship

HOW seriously the shortage of paper is affecting the supply of textbooks for students was the subject of timely comment in the *Manchester Guardian* recently. It is impossible for the student to-day to obtain, on the average, more than about half the new books required, and extremely difficult to augment these from the second-hand market. English publishers, handicapped by shortage of paper and forced to export about a quarter of their output, are consequently being overwhelmed by American publications. This journal receives from American sources more technical books for review and notifications of others in preparation or available than from all the English publishers together. Many of these products from the U.S.A. are excellent, but surely something might be done to enable our own specialist writers and publishers to compete with this invasion on equal terms. As technical and scientific books are given a priority when imported, it would not seem unreasonable to suggest that such publications should receive a very much more generous treatment when paper supplies are allocated.

Prospects in Copenhagen

More than 1000 British Displays

FURTHER facts about the British Exhibition in Copenhagen (September 18 to October 3) were furnished at a Press conference in London this week, which was addressed by Sir Guy Locock, C.M.G., vice-president of the Federation of British Industries. With more than a thousand British manufacturers represented there, the exhibition, it was stated, would be the largest and most comprehensive display of British goods ever held in Denmark or Scandinavia, and the first all-British exhibition to be held anywhere overseas since the end of the war. The opening ceremony, by the King of Denmark, in the presence of the Duke and Duchess of Gloucester, will also be witnessed by the Rt. Hon. Harold Wilson, M.P., President of the Board of Trade.

The exhibition area will approach 200,000 sq. ft. It is the third all-British exhibition to be held in Copenhagen. The first was in 1931 and the second in 1932, when the total area under cover was 65,000 sq. ft. Sir Guy Locock pointed out that in many cases the exhibiting firms will be displaying products which have never before been shown in Denmark, or in any other country abroad, for that matter. Judging by the number of British firms exhibiting, he said, they were apparently in no doubt about the good results likely to accrue from the enterprise at Copenhagen. In addition to their friends the Danes, they were expecting also an influx of buyers from Scandinavia and from many other countries.

Electronic Instruments

Trade Exhibition in Birmingham

SO successful was a trade exhibition of electronic instruments held recently in London that it has been arranged to hold a similar show in Birmingham. A new range of instruments for use in industry and research will be on display at the Grand Hotel, Birmingham, from September 20 to 24 inclusive. The exhibition will be open from 10 a.m. to 6 p.m. daily, and admission, which is free, will be limited to ticket holders only. Further information and tickets will be supplied to the trade only on application to Cinema-Television Limited, Worsley Bridge Road, Lower Sydenham, London, S.E.26.

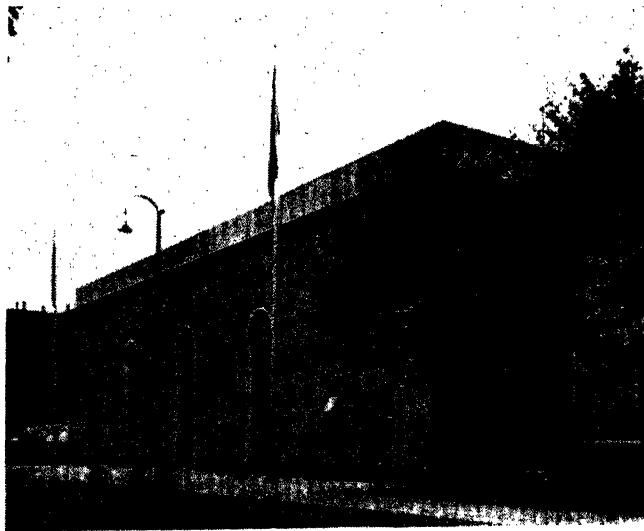
One of the most interesting exhibits will be the industrial electronic metal detector for detecting "tramp" metal in raw material and in manufactured goods before they leave the factories.

An electronic counter will be shown, which, counting at speeds of up to 30,000 per minute, can record the output of machines, or can be used in research work to count radiation particles. Another type of counter also shown is the decimal counter chronometer, which will measure short time intervals of up to one second in duration with an accuracy of plus or minus 10 microseconds.

Three new oscilloscopes will be demonstrated; the laboratory oscilloscope, for general work; the demonstration oscilloscope, including a 15-in. cathode ray tube; and the universal oscilloscope, of unit construction and designed to cover the widest variety of applications.

The main block of the Forum building in which will be displayed during the Copenhagen Exhibition, a representative variety of British industrial chemicals, some of which have not previously been shown publicly outside this country

Photo: Jonals Co.,
Copenhagen



Chemical Safety Conference

ABCM Programme for October

THE Association of British Chemical Manufacturers has invited the Royal Society for the Prevention of Accidents to organise on its behalf a chemical works safety conference, which will take place at the Grand Hotel, Harrogate, on October 29 to 31, 1948. The opening address will be given on Friday, October 29, by Sir Ewart Smith, of Imperial Chemical Industries, Ltd., and the programme will include the following lectures: "Health Hazards—Present and Future," by J. Gwynne Morgan, of the Mond Nickel Co., Ltd.; "Safety in Chemical Plant Design," by J. E. Braham, I.C.I., Ltd.; "Safety Organisation," by H. R. Payne, chairman, Works Safety Committee, ABCM; "Safety Records," by H. G. Winbolt, Director, Industrial Safety Division, Royal Society for the Prevention of Accidents; "Clearance Certificates," by A. G. Palmer, of the Gas Light and Coke Co. These papers will be followed by a "two-way brains trust" on which questions relating to chemical works safety will be answered.

The chairman for the opening address will be Sir Harold West, of Newton Chambers & Co., Ltd., and the chairman for the working sessions will be Mr. J. Davidson Pratt, director and secretary of the ABCM.

SMOKE ABATEMENT

THE attendance of the Minister of Fuel and Power, Mr. Hugh Gaitskell, at the annual conference of the National Smoke Abatement Society at Cheltenham, September 30 to October 1, will emphasise the growing alliance between the movement for smoke prevention and the national drive for fuel efficiency. Some 400 delegates from local authorities, Government departments, fuel and other technical organisations, as well as individual members, will be present.

A preliminary report will be given of a survey of the sources and incidence of atmospheric pollution conducted by the society by means of questionnaires to 1800 local authorities. The programme also includes a series of contributed "Progress Reports" on work of special interest being done by local authorities and other bodies.

At other sessions will be papers on "Smoke Prevention in Relation to Town Planning," by J. Nelson Meredith, city architect for Bristol, and "Smoke Abolition and the Public: Problems of Education and Propaganda," by Leslie Hardern.

Arresting River Pollution

Petition to the King

APETITION has been framed and is now in the hands of the Secretary of State for Scotland for presentation to the King, appealing for action to prevent the further pollution of rivers in Scotland by either industrial effluent or sewage. This campaign, sponsored by Lieut.-Col. R. A. B. Hamilton, of Wishaw, has the support of the Scottish Anglers' Association, representative body of the various local angling clubs. The petition complements earlier efforts to minimise the spoliation of rivers by trade or public effluents.

The petition declares: "The increasing addition of objectionable effluent such as sewage matter from both private and public housing schemes . . . poisonous, noxious or polluting fluid from factories or manufacturing processes carried on in riparian premises have unfitted many of the rivers of Scotland for any of the primary uses. . . . That administrative action by the authorities charged with the power and duty of enforcing the legislative remedies provided against these clamant ills has in very large measure been abortive and has failed to suppress the mischief."

ALLEGED FACTORY NUISANCE

ABREAKDOWN in the water supply of the washing tower at the works of Fisons, Ltd., Widnes, was given as the reason for an emission of a fine white powder which was alleged to have caused a nuisance in the Bridge Street and Dock Street area of Widnes, one day recently. This information was given at a meeting of the Widnes Town Council, when it was reported that work on the plant was immediately stopped upon the discovery of the nuisance, and repairs put in hand at once. A partial analysis of a sample of the white powder revealed that it contained 50 parts per million arsenic; .06 per cent lead; and .2 per cent copper. The dust also contained a high percentage of fertilising material. The deputy City Analyst gave the opinion that the metal contents of the dust were not abnormally high, neither was the arsenic content, although he was unable to say definitely how harmful the latter would be.

At the same meeting of the Widnes Town Council, it was reported that gases had been emitted from the factory of Albright & Wilson, Ltd. The firm had expressed regret for the nuisance caused, which had been the result of an accident at the plant. Immediate steps had been taken by the management to prevent such faults in the future.

CHEMICAL INDUSTRY IN CHINA

Slow But Steady Post-War Progress

TORN by 10 years of war, followed by civil strife in various parts of the country, resulting in the dispersal and destruction of industry and rapid currency inflation, China faces the long road back to economic recovery beset by grave difficulties.

In a survey of current economic conditions in the country, based upon reports from commercial and consular attaches, the U.S. Office of International Trade has produced a wealth of significant data regarding the present position of China's chemical industry.

The report states that, while the war years took inevitable toll of important production facilities, the industry is making significant progress towards reconstruction, but more foreign capital, technical assistance and raw materials are required to speed up recovery and accelerate output.

Post-War Activity

During hostilities in 1937/8, more than 75 per cent of China's chemical producing and consuming units were destroyed and it was not until 1947 that the chemical industry, under the five-year reconstruction plan, was allotted \$2 million for recovery purposes.

Following reorganisation of the Ministry of Economic Affairs in 1947, the National Resources Commission (originally established in 1935 to develop China's basic and important industries), was set up as a separate agency. By February this year it had 13 subsidiary chemical factories, 9 entirely owned and 4 partly owned, and significant increases in production were attained.

In 1947, the Commission manufactured 48 essential products and the output of 36 of these was greater than in 1946. Plants controlled by the Commission in 1947 were responsible for more than 30 per cent of the output of industrial acids and over 20 per cent of the alcohol production. Output was greater in those plants making sulphuric acid, fertilisers, sulphides and coke.

Nine alcohol plants were established during the war. The commission's Kunming-Chemical Works in Yunnan made soda ash, caustic soda, sodium sulphide, and allied products, using locally obtained sodium sulphate. In addition, the NRC owns a low-temperature coal-distillation plant in Szechwan, where large quantities of bituminous coal are found.

An important development is the oil-

cracking plant in Chungking where tung oil is treated to obtain gasoline substitutes and diesel oils. This is the first plant of its kind to be established in China.

Tung oil remains, however, a principal export and last year some 75,000 long tons were exported from Shanghai and Hong Kong. To increase output, more than 300,000 trees are to be planted in various districts.

Diminished Markets

On the other hand, diminishing export markets and the necessity to grow more foodstuffs, have seriously affected the output of menthol. In 1940 factories in Shanghai produced 1.5 million lb. of menthol and 850,000 lb. of mentholised peppermint oil. Last year only two out of twenty mills were in operation.

On a regional basis, Shanghai is industrially the most important city, and of the 200 chemical plants in operation in the area before the war 77 were active in early 1947. An estimated 60 to 80 per cent of the post-war consumption of fine and industrial chemicals is produced in the Shanghai district, and this situation is expected to continue for some time, because of unsettled conditions and transportation problems in the north. Shanghai has 76 chemical raw materials plants, 91 pharmaceutical factories, and more than 1400 plants consuming chemical products. Most of these have had to operate in a part-time basis because of the shortage of materials.

Hostilities dealt a severe blow to one of China's largest groups of inorganic chemical plants, the Yung Li Chemical Industries, Ltd., whose development was expected to assist in laying the foundation of a modern chemical industry. One of the company's nitric-acid plants, removed from Kiangsu Province, will probably be returned before the end of the year. Valued at \$500,000, the plant has a daily capacity of 100 metric tons. The Yung Li plant at Tangku, Hopei, producing soda ash and caustic soda, was taken over by the Japanese and operated by the North China Development Company. Current output of soda ash has been about 50 per cent of requirements, but when the Yung Li plant in Szechwan is completed, production from that factory plus that from the Tangku works is expected to make China almost self sufficient in soda ash.

Another important concern, Ta Chen Industrial Corporation, is producing vari-

ous chemicals including calcium carbide and sulphuric, hydrochloric, and nitric acids. Soda ash, sodium sulphide, lead and zinc oxides, barium compounds, as well as potassium chlorate and red phosphorous, are also produced at this plant.

The NRC's sulphuric acid plant at Hulutao is producing 50 tons of acid daily, using lead sulphide from Anhwei Province. A factory at Sinkiang has a daily capacity of 1100 pounds of sulphuric acid, while the Northwest Electrolysis Works is building a plant capable of producing 720 tons of caustic soda per year.

Fertiliser Position

A large market exists in China for fertilisers and existing production facilities are inadequate. The Pukow factory of Yung Li Chemical Industries produces 50,000 tons of ammonium sulphate a year and three former Japanese plants in Taiwan have a combined yearly output of 10,000 tons of calcium cyanamide and 30,000 tons of superphosphate. Deposits of phosphate rock, claimed to be sufficient to yield 2.5 million tons of fertiliser, have been discovered near Fengtal, Anhwei Province.

Prior to 1937, the Chinese paint and varnish industry was expanding steadily, but at the present time the only lithophone factory in the country is the Barium Chemical Works at Shanghai.

The principal product of China's dye-stuffs industry is sulphur black, but output is restricted by a shortage of raw materials. Fifty factories, with a combined potential daily production of 133,000 lb., are awaiting an improvement in the supply position.

Alsace Potassium Mining

The Mines de Kali Sainte-Thérèse, Mulhouse, the only private potassium mining company in Alsace, reports a net profit of 43.3 million francs in 1947 compared with the previous year's figure of 74.8 million francs. Reduced domestic sales and the effects of the over-valuation of French currency upon exports are given as the principal reasons for the fall in profits. The report adds, however, that mining operations during the past year produced a more normal level of 835,201 metric tons, compared with 670,303 tons in 1946 and results for the current year are expected to equal the best pre-war years. Despite the reduction in profits, the company has declared a dividend of 30 francs per share, equal to 24 per cent of the share capital of 160 million francs.

New U.S. Wattmeter

Wider Application Claimed

A NEW light-beam wattmeter developed to meet industrial demands for a portable, accurate instrument giving readings in the low-wattage and low-power factor ranges for frequencies of 25-3000 cycles has just been announced by the General Electric Company's Meter and Instrument Divisions (U.S.A.).

The new wattmeter's portable construction, high sensitivity, and low instrument losses make it applicable in cases where conventional wattmeters and pivoted type dynamometers operate under definite limitations.

The apparatus can be used in instrument-calibrating laboratories as a transfer standard from DC to AC current wattage for the calibration of other wattmeters and in the laboratory testing of small reactors, relays, fluorescent lamps, fluorescent lamp ballast, and core-cross measurements.

Safety Device

The instrument, completely self-contained in a walnut case, is available in two sizes—the large, high-sensitivity model and a smaller unit. Binding posts, current-circuit fuse, and the light source connection are mounted on an insulated plate at the back of the instrument, thereby reducing the possibility of operators making contact with a live circuit.

The scale, approximately 11 in. long, on a multi-range instrument is usually calibrated for lower-current circuit and 150-volt potential circuit.

The indicating element is built on the air-core electrodynamic principle with a taut suspended air-dampened moving element. To reduce further eddy current and hysteresis losses, few metal parts are used, making possible accurate operation at the higher commercial frequencies.

A beam of light, triple-reflected from front surface mirrors, produces a sharp line image on the translucent scale. The relatively long light beam helps to provide the high sensitivity and permits full-scale indication with only a 7-degree angular deflection of the moving element.

Full-scale wattage is indicated at power factors as low as .08, and full-scale indication obtained at ratings as low as 2 watts for 120 volts operation.

Lignite Prices Out.—To help to sell lignites produced in Italy, the State Railways of the country are allowing 10 per cent discount upon the usual rates for the fuel.

U.K. CHEMICAL PLANT IN SPAIN

To Increase Production of Nitrate Fertiliser

FOLLOWING the article on "Spanish Plans to Raise Nitrogen Production," in *THE CHEMICAL AGE* of August 21, it is interesting to learn how a British firm is participating in the development of the Spanish nitrogen industry, adding thereby to Britain's export total of chemical plant.

Bamag, Ltd., is the main contractor to Nitratos de Castilla, S.A., for its nitric acid plant which will be located at Valladolid and is based on the combustion of ammonia in air enriched with oxygen. The latter gas is obtained as a by-product from the manufacture of electrolytic hydrogen for ammonia synthesis. Absorption of the nitrous oxides is conducted under pressure slightly above atmospheric. The plant will produce a nitrogenous fertiliser which will consist essentially of a mixture of ammonium nitrate and limestone.

To facilitate erection of the plant for Nitratos de Castilla, S.A., a special technique has been used by the drawing office of Bamag, Ltd. The first step was an isomeric layout drawing of the absorption section, which is designed to prove also of great

assistance in the training of personnel before the plant is started up and put into operation.

Construction of the plant is stated to be well under way. The photograph here was taken recently and represents the same part of the plant as the layout drawing. It shows the supporting structure of the complete absorption section, the first of the series of absorption towers, and the plinths for the remaining towers and the storage tanks in course of erection.

Mention should also be made that Energía e Industrias Aragonesas, S.A., which is awaiting the completion of the hydroelectric schemes in the Upper Pyrenees of Aragon, has already ordered a nitric acid plant from Bamag, Ltd. The manufacture of this equipment is, we understand, almost complete, and erection is to be started before the end of this year.

New Oil Discovery in U.S.—A new oil producing zone in Gaines County, West Texas, has been discovered by the Shell Oil Company.



The technical drawings take physical shape: the first absorption tower erected and the others at the foundation stage at Valladolid

BAROMETER OF CHEMICAL INDUSTRY

Fuller Production and Use in June and July

CONSUMPTION in the principal chemical and related industries in June, showed a slight general increase according to figures published by the Monthly Digest of Statistics (No. 32, August, 1948) of the central statistical office. The July figures, in the few instances when these are provided, tend to show an even greater acceleration of production, when compared with the July figures a year ago. On this basis, marked improvements are shown to have taken place in respect of sulphuric acid, molasses, fertilisers, iron and steel. Consumption is shown to have followed the upward trend closely, in

most products, but the stock position, with a few exceptions, remains strong.

Numbers employed in the chemical, explosives, coke-oven, and by-product works were again slightly lower, but a small rise in the number of male workers in the oils, greases, paints, varnishes, etc., maintained the steady increase bringing the total of both sexes to 116,800.

Natural rubber showed an increase in consumption over the corresponding period last year.

Principal categories recorded of chemical production and use are as follows:—

	June, 1948			June, 1947		
	Production	Consumption	Stocks	Production	Consumption	Stocks
Sulphuric acid	129.2*	—	66.1*	107.0*	113.0*	62.8*
Sulphur	—	22.0*	86.4*	—	17.9*	79.0*
Pyrites	—	16.8*	70.0*	—	14.4*	76.0*
Spent oxide	—	17.0*	159.0*	—	13.8*	151.5*
Molasses	10.3	28.3†	192.5	8.8	31.8†	124.1
Industrial alcohol (mil. bulk gal.) ...	1.93	2.80	7.07	2.08	2.45	4.61
Superphosphate	82.1	47.2	88.4	80.9	48.0	138.0
Compound fertilisers	88.2	20.4	116.8	76.0	29.1	89.6
Agricultural lime	—	391.2	—	—	232.3	—
Ammonia	—	6.86†	4.93	—	5.28†	3.28
Phosphate rock (agricultural)	—	69.0	162.7	—	60.1	141.1
Phosphate rock (industrial)	—	6.8	29.7	—	5.4	38.0
Virgin aluminium	2.53	14.7	—	2.53	13.2	—
Magnesium	0.29	0.86	—	0.21	0.63	—
Virgin copper	—	31.7	85.1	—	31.1	302.3
Virgin zinc	—	19.8	51.1	—	19.2	26.0
Refined lead	—	18.0	28.0	—	16.9	22.3
Tin	—	2.21	15.2	—	2.18	15.0
Zinc concentrates	—	14.7	47.0	—	14.2	76.0
Pig iron	171.0*	—	272.0	143.0*	—	406.0
Steel ingots and castings (including alloys)	243.0*	—	—	232.0*	—	—
Rubber:						
Waste collected	0.05	0.29	10.1	0.13	1.47	66.8
Reclaimed	0.55	0.54	3.96	0.48	0.53	4.79
Natural	—	3.87	135.8	—	3.19	147.0
Synthetic	—	0.05	2.19	—	0.08	2.81

* July.

† Distilling only

‡ Average of five weeks.

New British Standards

The revision of standards to the following classes of fire extinguishers has just been published by the British Standards Institution: (i) Portable Chemical Fire Extinguishers of the Water Type (Gas Pressure); (ii) Portable Fire Extinguishers of the Water Type (Soda Acid); (iii) Portable Chemical Fire Extinguishers (Foam Type). In each case the principal object of the revision is to provide for welded construction in addition to the construction already covered in the original document. Full details are provided of the materials to be used, methods of construction, tests to be carried out on the finished extinguisher, and the required markings.

Industrial Water Heaters

Although the prices of domestic gas water heaters are still rendered almost prohibitive by the effect of the Purchase Tax, larger scale models for industrial use which are not subject to the tax, may be obtained for a reasonable outlay. A sink water heater, for example, at £7 provides ample hot water service for all washing and cleaning purposes. A boiling water heater at £10 15s. offers additional facilities of warm, hot, or boiling water at the turn of a tap. These two new Ascot heaters are available for delivery and installation in factories, shops, stores, hospitals, etc., excluding professional and commercial offices.

DIATOMITE FROM SKYE

Commercial Quantities Soon to be Produced

by ROBERT H. S. ROBERTSON, M.A., F.G.S.

AFTER a lapse of many years, the diatomite deposit of Loch Cuithir, near the famous Storr Rock, in Skye, is being worked again. In a matter of months, commercially significant tonnage of diatomite will be transported from the Misty Isle.

Scottish Diatomite, Ltd., was recently registered as a company to work the deposits, and one of the four subscribers is resident in Skye. Two more are professional men and the fourth is Mr. Hugo B. Millar, of R. D. Millar & Co. (Glasgow), Ltd., 73 Robertson Street, Glasgow, C.2, who is the moving spirit of the enterprise. Mr. Millar has taken over the rights of development from another Glasgow firm which had had the deposit carefully surveyed by auger and samples analysed by the Geochemical Laboratories, Ltd., of Alpertons, Middlesex. A research and development programme for further work is in hand, and some of the results obtained so far are given in the present account.

Ten samples have been carefully analysed from different parts of the deposit. Table 1 gives results of the analysis of the sample containing most silica, one containing the least silica and a third nearest to the average of the ten. Results are expressed as a percentage of the calcined material and of the material dried at 105° C.

Macaulay Institute for Soil Research, in Aberdeen, all failed to show any sign at all of the mysterious clay-like substance, yet it can be distinctly seen under the microscope, and can be readily concentrated in the coarser fractions by elutriation. A sample of the clay-material thus concentrated absorbed 19 milliequivalents of methylene blue per 100 grams of the dry material, under conditions where this test normally gives close results to base exchange capacity. This result led to the belief that the clay might be an illite, whose base exchange capacity varies from 20-30, but no sign of this clay-mineral can be detected by the excellent research methods employed.

Differential analysis shows that there must be less than 1 per cent of free quartz, but microscopic examination shows that the quantity is insignificant. The very small amount of carbonate impurity is almost entirely concentrated in the finest fraction, finer than 1.4 equivalent spherical diameter, and even then mostly finer than 0.4. In fact, this extremely fine fraction is the only one to give an interesting thermogram by differential thermal analysis, as pyrite is also present only in this fraction. The X-ray method revealed a small amount of feldspar, but no quartz.

If the elutriation fraction finer than 0.01

TABLE 1.

	Best	Calcined Average	Worst	Best	Dried Average	Worst
SiO ₂ ...	90.90	84.78	80.36	81.08	72.07	67.45
Al ₂ O ₃ ...	3.29	6.13	7.01	2.93	5.21	5.88
Fe ₂ O ₃ ...	2.25	3.99	5.85	2.01	3.39	4.93
MgO ...	1.42	1.55	2.61	1.26	1.32	2.19
CaO ...	1.23	1.97	2.21	1.10	1.67	1.86
Na ₂ O ...	0.32	0.66	0.49	0.28	0.57	0.41
K ₂ O ...	0.07	0.16	0.08	0.06	0.14	0.06
TiO ₂ ...	0.35	0.52	0.79	0.32	0.44	0.66
SO ₃ ...	—	—	—	0.12	0.11	0.09
S ...	—	—	—	0.19	0.27	0.42
H ₂ O + & carbonaceous matter ...	—	—	—	10.50	14.62	15.45
	99.83	99.76	99.40	99.85	99.81	99.40

In actual quantity there appears to be rather more of the average to best material than of the poorer qualities. The analyses throw but little light on the nature of the non-diatomaceous materials; microscopic examination shows a substantial amount of a clay-like mineral which readily stains with basic dyes, and only very small quantities of feldspar, quartz, pyrite and magnetite.

X-ray photographs, thermal dehydration curves and differential thermal analysis of various elutriated fractions, carried out by the

mm. is plotted against the silica content of the moisture-free diatomite, one gets a graph (Fig. 1) as illustrated. Only one point, No. 26, is far from a curve, but this sample is known to be different from all the others in having a very much lower loss on ignition. Absolutely pure diatomite has a water content of about 10.5 per cent, so it would appear from the first graph that about 68 per cent of absolutely pure diatomite would be finer than 0.01 mm. and 32 per cent coarser. The other end of the

curve points in the direction of 60-65 per cent, which means that the silica content of

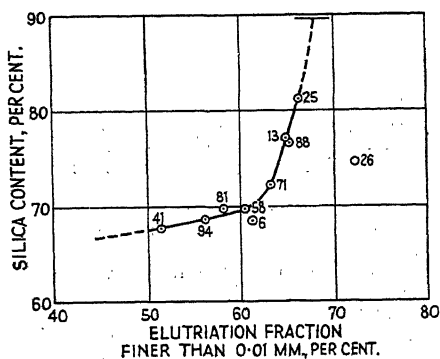


Fig. I

the impurities alone may be in the order of 60-65 per cent.

The second graph (Fig. 2) shows the "loss on ignition" plotted against silica content. The loss on ignition includes carbonaceous matter and water of hydration driven off above 105° C.; it does not include sulphur or carbon dioxide from carbonates, which were analysed separately and deducted from the total loss on ignition.

Here again, all samples lie near a curve except the anomalous No. 26. At the one end of the scale one can see a tendency to approach 90 per cent for the theoretically pure diatomite; but at the other end of the scale interpretation is really too risky. If the impurities have a silica content of 60 per cent, then they would have a loss on ignition as high as 20-23 per cent, but if the impurities contain 65 per cent of silica, the loss on ignition is likely to be between 17 to 18.5.

The gradual increase in loss on ignition with decrease in silica content is mainly due to increase in content of carbonaceous impurity as there is no evidence that inorganic constituents would have progressively higher degree of hydration; in fact, they are probably rather consistent in composition.

Analyses re-calculated to the basis of calcined material show, in fact, that there is very little variation in composition in the whole deposit, the silica content varying between about 80 and 90 per cent. This uniformity of composition and apparent ease of purification gives promise of superior grades in the future. The colour of the calcined material is a warm pink, which makes it suitable for cosmetics. The finest elutriation fractions contain most iron and therefore burn the deepest colour.

Specific gravity, packing density, and

elutriation analyses have been carried out on the ten chemically analysed samples, and from these results the percentage of voids has been calculated for loose and compact air-dried material. The absorptive capacity (a volume of liquid absorbed by unit volume of diatomite) is taken as being $\frac{2}{3}$ of the total calculated from the voids, since a completely saturated sample is a rather weak paste. At $\frac{2}{3}$ of the theoretical figure the mixture is substantially "dry." Figures are given in Table 2 for the same three samples as are quoted in Table 1.

TABLE II.

	Best	Average	Worst
Specific gravity, 15.5°C. ...	2.00	2.00	2.02
Weight per cu. ft., loose lb. ...	10.2	10.7	12.2
Weight per cu. ft., compact lb. ...	18.3	19.3	23.2
Voids, loose, per cent. ...	91.9	91.4	90.3
Voids, compact, per cent. ...	85.6	84.5	81.9
Absorptive capacity ...	3.7	3.9	3.7
mm Per cent.			
Elutriation —0.01 ...	66.1	63.1	51.6
0.01 —0.025 ...	20.0	13.2	15.3
0.025—0.05 ...	10.6	20.2	27.2
+0.05 ...	3.3	3.5	5.9

It can be seen from these figures that the high absorptive capacity is not much affected by the amount of non-diatomaceous impurity, though the packing density of the poorest sample is definitely lower than that of the best and average samples. The diatomite is in very fine particles and fairly evenly graded, and is essentially free from grit. Although the hardness of the clay-like material is unknown, it is believed not to be very different from that of the diatoms; the tests carried out so far suggest that the material is highly suitable for use in abrasives, polishes and scourers.

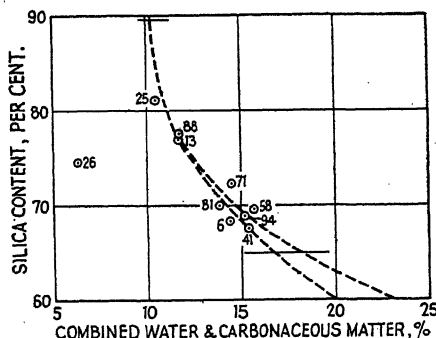
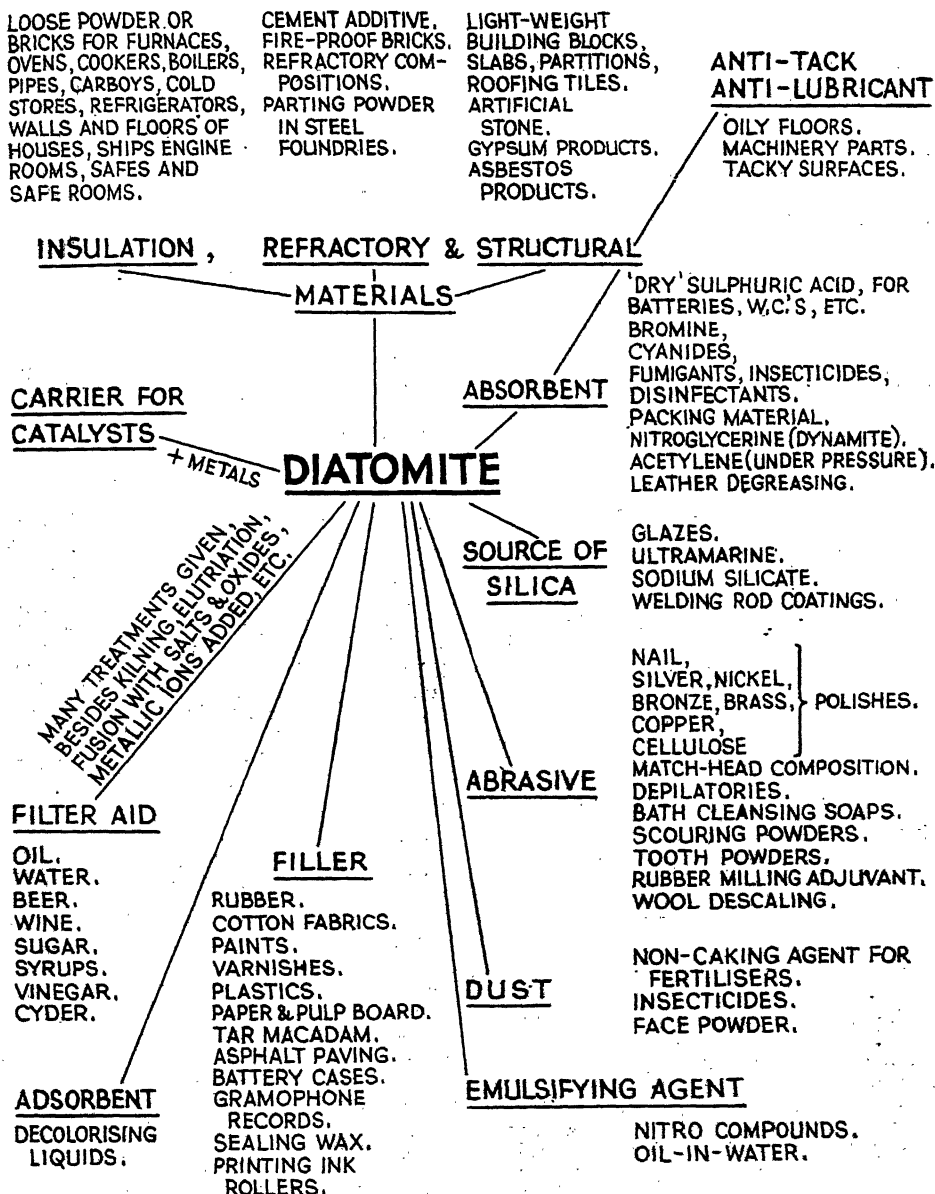


Fig. II

The specific surface of one sample by the air elutriation method of Lea & Nurse was nearly 20,000 sq. cm./g. This very large surface is probably of importance in many applications.

The development of a raw material in such

PROMISING APPLICATIONS OF DIATOMITE



a difficult locality as Loch Cuithir will be made easier by first working up all possible uses of the most simple processed material first. At present the indications are that the dried lump and dried disintegrated—nominally 100 mesh but actually finer—powder will create a substantial demand which will allow for refinements of technique in processing to be studied and added later.

Laboratory studies suggest that the diatomite is capable of being resolved into a number of interesting grades depending mainly on particle size distribution and total water content. At present, however, plant has been installed for drying and lightly disintegrating only.

The most promising applications of the Skye diatomite are as an abrasive in polishes, scourers, match heads, and other commodities, as an absorbent of acids, solvents, parasiticides, phenols, etc., as an anti-tack or anti-lubricant powder for floors, machinery rollers, etc., as a conditioning agent in compound fertilisers, as an ingredient in welding rod coatings, as a filler in plastics, battery cases, asphalts, etc., and

in many constructional materials. It can be used as a loose powdered filling for insulating between walls or sheets, as light weight insulating and refractory bricks, slabs and monolithic constructions, and also to improve the flow properties of cement.

The uses which are suggested in this article can be compared with a large number of published uses of all grades of diatomite, and it will be seen that the Skye material has many openings even in its present state of preparation. The success of the material in these applications will largely determine the technical future of the industry; the North of Scotland Hydro-electric Board will be providing power from a scheme only a few miles away from Loch Cuithir, and development will certainly be easier when electric power is available.

The author wishes to thank Dr. R. C. MacKenzie for thermal analyses, Mr. Walker for X-ray work, Dr. Hart for microscopical examination, and the Director of the Macaulay Institute where tests were carried out, and Mr. S. G. Henderson for a specific surface determination.

DDT INEFFECTUAL?

THE immunity of the house fly to DDT is reported by Dr. S. F. Chellappah, Director of Medical and Sanitary Services, Ceylon, who has recently returned from a trip to Europe. He said that he had visited the Pontine marshes in Italy to see the methods adopted to combat the fly menace and malaria. These had been rather serious, but an intensive campaign of DDT spraying at first seemed satisfactory; after a time, however, it was found that while it continued to be fatal to mosquitoes, the house flies did not succumb.

Octa-Klon was then tried with success. Dr. Chellappah states that he thinks this should prove an excellent insecticide to meet the fly problem in Ceylon. It is at present expensive, as it is being manufactured only in small quantities.

Mechanical Handlers

The latest types of dumpers, loaders and shunters, will be shown by E. Boydell & Co., Ltd., of Manchester, at the Public Health and Municipal Engineering Exhibition to be held at Olympia, London, in November. The Muir-Hill dumpers have a capacity ranging from 3 to 6½ cu. yd. Double articulation gives greater stability to the new loaders which can work under a roof 8 ft. in height, and has an under bucket clearance when tipped of 10 ft. 8 in. For handling wagons, the Muir-Hill shunter is capable of moving 100 tons on straight level rail.

SCOTTISH NEWS ITEMS

IN the course of a visit to the Scottish Algalic industry's factory at Orasay, South Uist, last week, Mr. Tom Fraser, Under Secretary for Scotland, and Lord Morrison were shown by Mr. Charles Cameron, manager, the latest products made from seaweed. Custard powder, nylon thread, non-inflammable cinema curtains, uncrushable fabrics, hygienic gauze for internal dressings and moulds for taking impressions of false teeth were among the articles shown. During the past year, over 6000 tons of seaweed for the factory have been gathered by South Uist crofters.

Oil-from-Herring Plant.—The first commercial oil-from-herring plant to be assembled in Scotland, which has been established at Wick by the Herring Industry Board, began working last week. The plant is the result of a long period of research and experiment during which D.S.I.R. chemists have worked on methods of converting herring oil to commercial use. The bulk of the oil derived will go into the manufacture of food products, and it has been indicated that there will not be any surplus available at present for subsidiary or by product purposes. These will develop at a later stage.

Unrest in Scottish Oil Industry.—Strike action on September 8 was threatened last week by 600 employees at the Pumpherston works of Scottish Oils, Ltd., because one man had refused to join the National Union of Shale Miners and Oil Workers.

HIGH STRENGTH HYDROGEN PEROXIDE

Improving the Purity of Solutions

by V. W. SLATER and W. S. WOOD

AMONG the more inactive surfaces of vessels used as containers of hydrogen peroxide are those of glass, quartz, and certain synthetic materials but, with the possible exception of the latter, these materials are not always suitable for construction purposes. However, the surface activity of aluminium and certain types of aluminium alloy, *e.g.*, magnesium aluminium alloys, is not very much greater than that of glass under normal conditions, and therefore, we find that these materials are used extensively in the handling and use of hydrogen peroxide.

The above statements must be qualified by reference to the purity of the solution in contact with the material. For example, considerable decomposition may take place in glass vessels if, as may happen, sufficient alkali is dissolved from the glass to neutralise the minute trace of acidity in the solution and, as a result, the solution becomes unstable. This effect in glass vessels is not likely to result if the hydrogen peroxide be impure, due to the presence of traces of acid.

Contact with Metal Surfaces

On the other hand, if the hydrogen peroxide solution is in contact with metal surfaces and is slightly acid, it may dissolve the metal, giving cations having pronounced activity. This can be illustrated by reference to copper which, in contact with commercial solutions of hydrogen peroxide containing traces of acid is rapidly corroded, giving copper ions in solution and rapid decomposition. In contact with pure solutions, however, copper is only slowly attacked, and the rate of decomposition is not so much increased.

It is important to note that the total decomposition caused by the heterogeneous reaction is dependent upon the ratio of the surface area in contact with unit volume of solution and, therefore, with large containers which have a low surface/volume ratio, the total decomposition due to this factor is less than that for small containers, where the surface/volume ratio is greater.

Mention has often been made in the literature to the decomposition caused by dust particles in hydrogen peroxide. It has been definitely established that certain types of suspended matter do promote de-

composition, even though the amount is small and not readily visible. In fact, certain types of stabilising substances are assumed to function because they neutralise the effect of suspended matter.

Stabilising Factor

It is well known that the rate of decomposition of hydrogen peroxide increases with increasing temperature. The rate of decomposition is doubled for every 10°C. rise in temperature, and the effect of temperature becomes particularly noticeable at 50/60°C. However, solutions of hydrogen peroxide can be stabilised so that there is little decomposition under most conditions when stored at temperatures up to 40°C.

Decomposition may be promoted by light, *i.e.*, photo-chemical reactions, but this is usually of less practical significance than the other factors since it is unusual for the solution to be exposed for any length of time to actinic rays. Thus stability is mainly dependent upon the purity of the solution, the surface in contact therewith and the temperature to which it is subjected. These factors operate with both stabilised and unstabilised solutions.

There are many references to substances which are claimed to be stabilisers or negative catalysts, but by modern standards it would be difficult to substantiate many of the claims. The majority of substances recommended are organic compounds, but only a few of these are now considered to have high stabilising properties, and their action is usually more effective in the low strength range. The Germans claimed to have discovered a new organic stabiliser, 8-hydroxyquinoline, which was said to function because of the facility with which this substance forms complexes with certain ions, particularly aluminium, a metal used for containers.

Inorganic Stabilisers

Among inorganic stabilisers, the best known are the phosphate compounds, particularly sodium pyrophosphate.

One factor generally accepted is that the solution must be slightly acid, but for the pure high-strength solutions, the degree of acidity is very low, of the order 0.5 milli equivalents per litre for 90 per cent pure solutions compared with 20 milli equivalents for the 30/35 per cent commercial solution.

(Continued overleaf)

It is common practice to use two or more stabilisers and, in fact, for the most stable of the German products three substances were added, phosphoric acid, sodium acid pyrophosphate and 8-hydroxyquinoline.

Probably the most important factor which has improved the stability of hydrogen peroxide is the improvement in the purity of the solutions now produced. One American manufacturer claims to have produced a solution sufficiently pure to be stable without any addition of a stabiliser.

The actual study of the stability question from the practical point of view is not simple owing to the difficulty in obtaining reproducible results. This is probably due to the fact that the final stability of the solution is the result of the combination of the factors outlined above. Figures quoted for stability should indicate the conditions under which they have been obtained, for example, the size and material of the container, the temperature of storage and the purity of the solution. It is the lack of reference to these factors which makes many results given in the literature of little value.

Modern Standards

By modern standards, for practical conditions of use or storage, a loss of 1 per cent in strength, i.e., drop from, say, 90 per cent to 89 per cent, may take place over one year at temperatures normally experienced in this country.

On the other hand, if the material is to be used for storage, it must have a low surface decomposition factor as well as a satisfactory resistance to corrosion. Therefore, whereas some grades of stainless steel may be suitable for certain pump or valve parts, they would be unsuitable for long-term storage tanks.

It is in any case unwise to allow even small quantities of hydrogen peroxide to be retained within a unit made of material having a high surface decomposition factor; in this case it is advisable to provide suitable draining facilities.

It is also important to bear in mind that if the hydrogen peroxide is allowed to come into contact with certain unsuitable materials, even for short lengths of time, the solution may be rendered unfit for subsequent long-term storage even in a suitable container, since the original contact may have promoted instability.

It is therefore necessary to refer results quoted for the suitability of a material for hydrogen peroxide to the purity of the solution, the degree of corrosion of the metal, the amount of decomposition occurring and the use for which it is suggested, in addition to such factors as temperature, etc.

In carrying out corrosion tests, it is advisable to guard against photo-chemical decomposition, since this, in some cases, may be greater than the actual surface decomposition.

The most suitable metal for pure hydrogen peroxide solution is aluminium, preferably of 99.5 per cent or higher purity and, therefore, storage tanks are almost exclusively made of aluminium. The magnesium aluminium alloys containing up to 7 per cent magnesium show good corrosion resistance with low surface decomposition factors and, since these alloys have a greater mechanical strength than aluminium and better working properties, they may be used for castings and machine parts. The aluminium silicon alloys are not so satisfactory as regards corrosion resistance and surface decomposition, but are sometimes used.

Stainless austenitic steels generally show good resistance to corrosion but often have a high surface decomposition value which makes it unwise to use them for storage containers. The suitability of these steels can be improved by acid pickling or by imparting a high polish to the surface. Such materials, therefore, find application in equipment for handling hydrogen peroxide, e.g., pumping. Corrosion tests have indicated that tin, nickel and heavily chromium-plated surfaces may find application for short-term contact.

Of the unsatisfactory metals, mention should first be made of lead, which promotes violent decomposition with high-strength hydrogen peroxide. Copper or copper alloys are unsatisfactory owing to the destabilising action of micro quantities of copper ions. Mild steel and iron, whether wrought or cast, are rapidly oxidised and cause decomposition.

Satisfactory Plastics

Some of the modern synthetic materials show considerable resistance to corrosion and have low surface decomposition factors. Both plasticised and unplasticised polyvinyl chloride is usually satisfactory with minor differences in behaviour according to the plasticiser used.

Typical suitable grades of polyvinyl chloride are Koroseal and the German Mipolam and Vinidur. Polythene (or alkathene) shows behaviour similar to polyvinyl chloride, while polystyrene and possibly butyl rubber also give reasonably satisfactory results. Methyl methacrylate (Perspex) is fairly satisfactory for, say, 30/40 per cent hydrogen peroxide solutions, but is not always suitable for higher strength solutions.

Natural rubber is usually readily oxi-

dised, even with comparatively low-strength solutions.

Many efforts have been made to provide a suitable non-active or non-corroding surface by spraying surfaces with certain metals or synthetic materials, but, so far, no great success has attended this work since the films are usually sufficiently porous to allow the hydrogen peroxide to penetrate, causing surface decomposition, and eventually "lifting" the film.

Closure of Containers

It will be gathered from the above that special types of closure are necessary for storage containers since there is always some decomposition, however slight, and always the possibility of contamination with active catalysts. Thus, unless the oxygen liberated is allowed to pass out of the container, dangerous pressures may build up, with ultimate bursting of the vessel.

The necessity for such closures complicates the transport problem and, therefore, much thought and effort has been given to the design of the closure. A typical pattern comprises a perforated domed screw cap. To prevent splashing of liquor into

the cap a perforated tube is provided, closed at the bottom and filled with small Raschig rings.

With the high-strength product, splashing of the liquid must be avoided, as it may cause ignition of organic matter with which it comes into contact, resulting in serious fires.

With the exception of small quantities normally required for experimental work, and for which a suitable glass container is used, the transport of high strength hydrogen peroxide is invariably in aluminium containers. These containers include large rail tanks of about 20 tons capacity, road lorry tanks of 2 to 3 tons capacity and drums 100 to 400 lb. capacity.

[The authors of this paper conclude with acknowledgments to the directors of Laporte Chemicals, Ltd., who sanctioned its publication, and Messrs. C. O. Bishop, G. Clennett and W. R. Holmes, who were among those who collaborated in its preparation.]

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(Concluded)

New U.S. Chemical Plant

Subsidiary of Phillips Petroleum Co.

THE Phillips Petroleum Company of the United States has expanded its chemical activities through the formation of a wholly-owned subsidiary, the Phillips Chemical Company. The new company has leased on a long-term basis the Cactus Ordnance Works at Etter in the Texas Panhandle and will also build a new ammonium nitrate plant at Etter. Cactus Ordnance is one of the largest ammonia plants in the world and will be used by the company to produce ammonia for nitrogenous fertilisers. It is expected that present plant capacity will be doubled from approximately 70,000 tons to more than 140,000 tons. Under the lease agreement, the United States Government may purchase products from this plant for its foreign relief export fertiliser programme until June 30, 1952.

The company's plans for the future include the acquisition of a large site on the ship channel near Houston, Texas, where a plant will be built for the manufacture of sulphate of ammonia. This site is of sufficient size to permit the addition of the several other chemical plants which are planned.

Boake Roberts in S. Africa

Australian Plant Also Projected

SPEAKING at the recent fifty-first annual general meeting of A. Boake Roberts & Co., Ltd., the chairman, Mr. E. J. Boake, announced that early next year the company hoped to start manufacture on a small scale in South Africa. They had, he said, registered a company there under the style of A. Boake Roberts & Co. (S.A.) Pty., Ltd. Their plans for Australia were not so far advanced. It was their intention, said Mr. Boake, as soon as circumstances permitted, to manufacture some of their products in that country, and they had therefore taken steps to form a separate company under the style of A. Boake Roberts & Co. (Australia), Ltd.

The company's net profit for the year, after all charges, but before making reserves for taxation, was announced to be £229,007, compared with £238,279 a year ago.

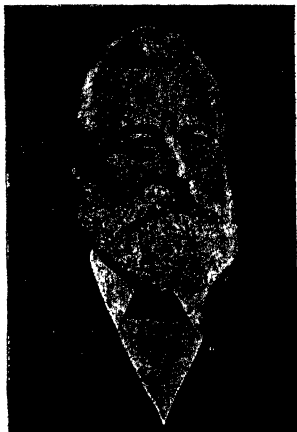
U.S. Coal Experts in Australia.—American coal experts have advised the Australian Joint Coal Board that 107,000,000 tons of coal now used as pillars in Australian black coal mines can be extracted with the aid of machines. The quantity of coal in the pillars represents 8 to 10 years' normal production.

J. A. R. NEWLANDS (1837-1898)

A Pioneer Whom the Chemists Ridiculed

by JAMES A. CAMERON, B.Sc.

EUROPEAN science in the 19th century was all too prone to disparage the creative work of the young scientist Pasteur, and Van't Hoff, Arrhenius were among the many who suffered in their earlier years from the sterile, abusive criticism of the learned



John Newlands

graybeards; it says much for their moral stamina that they were not deflected from their purpose by "lack or honour in their own countries."

The twentieth century has a better record in this respect—it is now commonly recognised that it is the young scientist to whom we must look to continue the course of innovation—and it is difficult to-day to understand the attitude of mind of those who were often deliberately cruel to the young men and women, who sometimes saw more clearly than their elders.

Of all who experienced such treatment, none suffered more crushing ridicule than the Englishman whose death was reported in the issue of *Chemical News*, dated August 18, 1898, in the following brief notice:—

"We regret to see the announcement of the death of Mr. J. A. R. Newlands, to whom belongs the credit of the discovery of the periodic relations between the atomic weights of the elements. In the year 1887, Mr. Newlands was awarded the Davy Medal of the Royal Society in recognition of his work."

Thus quietly ended the career of one who had played the leading rôle in what was

perhaps the most unhappy incident in the history of British science.

John Alexander Reina Newlands, born in Southwark, London, in 1837, was the second son of the Rev. William Newlands, a Master of Arts of the University of Glasgow and a minister of the Established Church of Scotland. Of John's earlier years not much is known, for he was educated privately by his father; that this training would be on thorough lines and not devoid of the liberal arts seems to be guaranteed by Scottish tradition and the Italian descent of his mother. In the light of subsequent events it would, however, appear unfortunate that he ever became acquainted with music! He must soon have acquired a taste for chemistry, for in October, 1856, he entered the Royal College of Chemistry as a student under Hofmann and, after one year at the College, became assistant to Prof. Way, chemist to the Royal Agricultural Society.

In 1860, the young Newlands, inspired by the call which has led so many Englishmen into distant lands to help the oppressed, interrupted his studies to journey to Italy to join the insurrectionary movement under Garibaldi. Not until the conclusion of the campaign did he return to England to resume his work with Prof. Way.

There is no record of his meeting with Cannizzaro during this Italian adventure, but undoubtedly the keen young chemist must have been greatly influenced by the Karlsruhe Conference of 1860, at which the hypothesis of Avogadro was brought out from its 50-year old obscurity, to make clear the concept of the molecule and to clarify the ideas of both Mendeléeff and Lothar Meyer, the latter relating that "it was as though scales fell from my eyes, doubt vanished and was replaced by a feeling of peaceful certainty." Such an historic pronouncement could not have escaped the notice of the youthful and zealous chemist.

Analyst and Teacher

In 1864, Newlands left Prof. Way and began to practise on his own account as an analytical chemist in the City. About this time and for some years to follow, he taught chemistry at the Grammar School of St. Saviour, Southwark, at the School of Medicine for Women and at the City of London College.

One can picture Newlands, full of confidence and energy, his mind revolving new ideas, still to be formulated, of a grand and

orderly arrangement of all the materials of the Universe. He may well have been impatient with the older chemists, who had for so long rejected all attempts at classification of the elements, from Prout's hydrogen hypothesis to Dobereiner's triads, and who had ignored the vitally important "Hypothesis of Avogadro."

An enormous amount of work must have been packed into the period 1864-65—he mentions trying other schemes, including one based on density—for in August, 1865, fully four years before the publication of either Mendeléeff's or Lothar Meyer's findings on the same topic, Newlands, in a letter to the Editor of *Chemical News*, split his famous infinitive in the following terms:—

"If the elements are arranged in the order of their equivalents, with a few slight transpositions, as in the accompanying tables, it will be observed that elements belonging to the same group usually appear on the same horizontal line.....This peculiar relationship I propose to provisionally term the 'Law of Octaves'."

This was followed a week later by another letter to the Editor, in which Newlands endeavoured "to show that all the numerical relations among the equivalents, pointed out by M. Dumas and others, including the well-known triads, are merely arithmetical results flowing from the existence of the 'Law of Octaves'."

These two letters, despite the sweeping generalisation which they contain, seem to have made but little impression on the chemical thought of the period. This was not exceptional; new ideas need time for their assimilation. The sequel, however, was distressing.

On March 6, 1866, Newlands, impetuous, thoroughly convinced he was on the right track, expounded these views in a paper read to the Chemical Society, of which he was a member. He must have approached this meeting of the society with high hopes of praise and acceptance of his idea—he was then only 29—and, at the least, of informed discussion by older and more learned fellow-members and criticism which would help to clarify those points which he knew to be still obscure.

Ridicule

The distinguished audience was mainly hostile. "Dr. Gladstone made objection on the score of its having been assumed that no new elements remained to be discovered. The finding of one more would throw out the whole scheme." This objection seemed perfectly valid and was one that Newlands might well have foreseen. Perhaps too he stressed overmuch the musical parallel; scientists are very wary of analogy.

Newlands could not, however, have foreseen the reception which his paper evoked—hilarious, uproarious laughter! The diehards of the Chemical Society enjoyed themselves to the full at the expense of this foolhardy young upstart, who presumed to desecrate Burlington House with such pretentious nonsense—badly prepared at that. Prof. G. F. Foster fairly, if acidly, expressed the feeling of the meeting, when he asked the lecturer if he had ever examined the elements according to the order of their initial letters—and again Burlington House rocked.

For these learned gentlemen it was the most entertaining evening they had had for years. Newlands' ideas were rejected with contempt and ridicule and it was agreed that his discourse was quite unfit for publication in the society's journal.

It is difficult now to understand the indifferent reception of Newlands' views. Certainly they were revolutionary and imperfect, possibly badly expounded; but nothing can excuse the gross breach of good manners. It is possible that had Newlands spoken in broken English and possessed an imposing-sounding Russian name, he would have been received with respect, even if he had used the initial letter classification suggested by Prof. Foster.

Never Recognised

Nor did the Chemical Society ever do full justice to Newlands. The award of the Davy Medal of the Royal Society jointly to Mendeléeff and Lothar Meyer in 1882 for their work on periodic classification must have called disagreeable recollections to some learned minds. The belated recognition of Newlands' prior claim by a similar award in 1887, largely on the representations of Dr. Franklands, of valency fame, was followed by no corresponding gesture on the part of the Chemical Society. Two years later, in 1889, the Chemical Society belatedly paid recognition to periodic classification—the Faraday Medal was awarded to Mendeléeff!

The ridicule of so influential and learned an assembly must have made Newlands distrust his own powers of reasoning. How could he have been led so far astray by this chance resemblance between music and chemical architecture? So many distinguished scientists could not possibly be wrong! Acknowledgment of the correctness of his views came much too late to have any real influence on his subsequent development; thus one of the most remarkable brains of the nineteenth century was lost to theoretical chemistry.

From this time on, Newlands devoted his energies to technical chemistry. He re-

(Continued at the foot of page 356)

Another Aluminium Alloy

Ease in Die-Casting

MR. J. B. NEIMAN, manager of the aluminium department of the Federated Metals Division of the American Smelting and Refining Company, New York, recently revealed for the first time the development of a new economical die-casting alloy made of copper, silicon and aluminium, which is said to overcome former problems of drilling, tapping and machining castings made from other alloys. The new alloy will be known as F-4110, under a nomenclature system developed by Federated Metals Division, which reveals the composition of the alloy. The name means 4 per cent copper, 11 per cent silicon, no magnesium and balance copper. Mr. Neiman explained, adding that some of the engineering societies were studying the merits of this nomenclature technique.

The features of the alloy were described by Mr. Neiman as including ease of casting equal to former alloys used by die-casting foundries. However, there is less tendency for castings to weld to the die during the casting process, he said. In physical properties it is claimed to have appreciably higher tensile strength, yield strength, and proportional limit and higher hardness. In addition, the castings have been found to assume a whiter finish after casting, and the final cost of casting is lower because the alloy is generally cheaper than the primary 12 per cent silicon alloys. The product is also more available in supply, Mr. Neiman said, because of the additional copper content, which makes it easier to obtain raw material.

Industrial Brazil

Large Metal and Mineral Development

ACCORDING to the Brazilian Government Trade Bureau in New York, figures of industrial development in Brazil for the ten-year period ending 1947 show substantial advances, especially in basic products such as iron, steel, coal and cement.

In the ten-year period since 1938, output of pig-iron increased 293 per cent, steel 320 per cent, rolled steel 269 per cent, coal 120 per cent, and cement 48 per cent. While in 1938 in the whole of Brazil there were only 10 small mills turning out pig-iron, in 1947 there were 17, apart from the huge new Volta Redonda mills. Compared with eight mills producing steel in 1938, Brazil now has 25 besides Volta Redonda. Some forty Brazilian mining companies are now producing coal, while in 1938 only two main mining areas were being worked. Santa Catarina coal, the country's best, represented only 19 per cent of national output in 1938; now it is about three-quarters, and there has been improvement in the grade of coal available for industrial use. Pig-iron output increased from 122,352 metric tons in 1938 to 480,538 in 1947; steel production rose from 92,420 to 388,024; rolled steel from 8566 to 315,773; coal from 907,224 to 1,995,878; and cement from 617,896 to 913,525 metric tons.

Free Entry for Superphosphate.—The Director General of Customs, Chile, has re-classified ammonium superphosphate (under Tariff No. 951) to permit its importation free of duty.

J. A. R. NEWLANDS

(Continued from previous page)

mained until his death a member of the Chemical Society and took an active part in its proceedings; but speculative chemistry gained little from him.

In 1868, he became chief chemist at Mr. James Duncan's Sugar Refinery at Victoria Docks, where numerous improvements in processing, particularly the so-called alum process for the purification of beet molasses, were due to his inventive genius. In collaboration with his brother, he published a treatise on "Sugar, a Handbook for Sugar Growers and Refiners", and made various contributions to technical literature of the period, including articles on "Sugar" in Thorpe's Dictionary.

Foreign competition gradually brought about the decline of Mr. Duncan's sugar

business and finally, in 1886, Newlands resigned from the post, which he had held for 18 years, and joined his brother in independent practice as analytical consulting chemists.

Prompted, no doubt, by the Davy Medal award to Mendeléeff and Lothar Meyer in 1882, Newlands in 1884 published a small volume containing a reprint of all his papers on atomic weights, with some additions embodying his later views on this topic. This volume probably played some part in the tardy recognition which was accorded to Newlands by the Royal Society in 1887; but nothing more of theoretical significance appeared. Newlands had become and remained until the end a competent, industrial chemist, with little remaining of that early genius. That had been massacred to make a chemists' holiday.

A NEW SOURCE OF CRESYLIC ACID

Basic Requirement of Many U.S. Industries

CRESYLIC acid, a coal tar chemical which a generation ago was employed only to kill bed-bugs, is now finding so many new uses in industry that a critical shortage of the compound has developed. Dr. Sidney A. Savitt, of the M. W. Kellogg Company, New York, and Dr. Robert S. Aries of the Polytechnic Institute of Brooklyn, told one of the closing sessions of the 114th national meeting of the American Chemical Society, in Washington, D.C. The shortage is so pronounced, they said, that petroleum chemicals are being utilised to supplement the cresylic acid obtained from coal tar.

They observed that one of the biggest uses of cresylic acid was in the expanding plastics industry. Of the billion pound production of finished plastics in the U.S.A., about a fifth used phenol, cresols, cresylic acids and higher boiling phenols. Cresylic acids were especially useful in mouldings, lamination, coatings of textiles, and adhesives.

Imports from England

In addition to domestic production of 26 million lb. of cresylic acids, the U.S.A. found it necessary to import about 20 million lb., primarily from England. Another large use of cresylic acid was in ore flotation. With the continual impoverishing of the ores mined, more and more agents were needed to aid economic extraction. Luckily, cresylic acid has been found to be a good agent for the manufacture of a large number of ore flotation chemicals, and about 10 per cent of its output now goes into this field.

Textiles, medicinals, dyes and inks consume another 10 per cent of the cresylic acid. Although 30 per cent of the cresylic acid is made from petroleum, much of that goes back into the field, as cresylic acid is used in the refining of petroleum for the manufacture of speciality oils and greases. Cresylic acid is used to inhibit gum formation in cracked gasolines and as a selective solvent in the purification of these gasolines.

Toluene Base

The general field of disinfectants and insecticides consumes about 10 per cent of the cresylic acid as a bactericidal agent.

The speakers went on to say that new uses for cresylic acids are being revealed every day and that in order to relieve the critical shortage research was being carried out at the Polytechnic Institute on the manufacture of synthetic cresylic acids. Since both petroleum and coal tar seemed to be inadequate, a new base had been found. This was toluene, another by-product of both coal tar distillation and petroleum refining. This toluene is converted into a mixture of cresylic acids by means of sulphonation followed by caustic fusion.

Toluene is one of the very few chemicals in ample supply at present, since its main use was in the production of TNT, and output had been enormously expanded in this war.

Staff Training: Scottish Plan to Recruit Technicians

COLVILLES, Ltd., of Motherwell, one of the largest steel manufacturing groups in Great Britain, has launched a comprehensive recruitment and training programme to cover all apprentices in all the company's plants and including apprentices in metallurgy, chemistry, and the various engineering sections.

Behind this scheme is the basic concept of training apprentices to permit them the maximum advancement and expression of their individuality and of creating a reserve of first class technicians in every section to replace the normal losses of existing senior personnel. As the group has a very considerable programme of expansion ahead this scheme is urgently needed.

A similar programme is now being planned to cover the larger number of unskilled and unapprenticed workers throughout the associated steelworks of the company in Scotland with a view to enabling them to improve their status. The present scheme consists of a two-week period of intensive training in classes of approximately 30 with a large number of guest speakers and films, followed by a period of practical work in the steel plants. The third phase involves a further period of intensive work during which the personnel staff will attempt to determine the results of the programme on individuals as well as on the apprentices as a whole.

American Chemical Notebook

From Our New York Correspondent

SALES of the chemical process industries during the first half of 1948 soared to an all-time record of \$4.5 million, which was 20 per cent above the total for the same period of 1947. Although part of the gain reflects the continued rise in prices, much of it was due to an enormous increase in output made possible by the largest programme of plant expansion conducted by any industry during 1947-48. Last year, the chemical industry, proportionately the nation's most profitable, spent \$1.5 million on new factories and equipment, and it plans to spend another \$1.2 million this year. These were among the facts made known to members of the American Chemical Society by Dr. Robert S. Aries, professor of chemical engineering at the Polytechnic Institute of Brooklyn, N.Y. The percentage of return of the chemical industry in 1947 was 19 per cent, compared with 17 per cent for all industry, while the percentage return per sales dollar was about 10 per cent, compared with 7 per cent for all industries. A study of the income of 50 leading chemical companies showed that 15 made a profit of between 1 and 5 per cent on the sales dollar; 14 made between 5 and 10 per cent, 13 between 10 and 15 per cent, five between 15 and 20 per cent, and two more than 20 per cent. The chemical companies spent more for research than any other group, which was probably a principal reason for their success.

* * *

Further application of the science of ultrasonics to industry and agriculture appear to promise important, possibly arresting results. One and a half million vibrations per second, guided to a specific point by means of quartz crystals, will be one of the principal means of harnessing ultrasonic sound waves for industrial use, according to a joint statement issued last week by Dr. T. Smith Taylor, head of the research division of the United States Testing Company, Inc., Hoboken, New Jersey, and S. I. Ward, president of the Crystal Research Laboratories, Hartford, Conn. First steps have already been taken with the establishment of an industrial research programme at the Testing Company's New Jersey laboratories, based on the laboratory models of a new device known as the Ultra-Sonorator. For two years, studies of the possible effects of ultrasonics in agriculture have been made by Dr. Raymond H. Wallace at the University of Connecticut. The next harvest is expected to confirm

much of the data last year's experiments indicated. Dr. Wallace states they have already established that rapid germination can be produced with ultrasonic vibrations at 400,000 per second in grains and sunflower seeds, and it was possible entirely new varieties of plants could be produced. The laboratory models of the Ultra-Sonorator have a range from 400,000 to 1,500,000 vibrations per second, sufficient to produce many emulsions and give rise to numerous other interesting phenomena.

* * *

The U.S. Patent Office disclosed last week that Patent No. 2,393,227 covering an apparatus for removing moisture from iron ores has been made available for licensing or sale by the owner, Mary Frenzel Anderson, of Buhl, Minnesota. The patent covers a drying stack for removing moistures from the ores in which a conveyor deposits a mixture of lump and fine ore in a hopper which discharges the ore into the interior of the circular upright stack. There it falls over a conical bell member and passes into the stack. The bell is rotated and distributes the ore below the bell. The fine ore is distributed adjacent to the inner surfaces of the walls, and the lump ore occupies the centre of the stack. A number of triangular heating ducts having escape openings are positioned in the stack in the downward path of the ore between the bell member and discharge opening.

* * *

Despite the fact that United States stocks of tin have been rising for the past two years, the domestic supply of tin is still well below the quantity held when the war started. Reporting on tin operations for the year ended June 30, 1948, the department of Commerce disclosed that stocks rose by 24,338 tons, and that total stocks on June 30 amounted to 77,559 tons, which compares with 67,387 tons on last January 1, and 53,221 tons on June 30, 1947. A comparable figure for January 1, 1942, less than a month after the Japanese attack on Pearl Harbour and the U.S. entry into the war, was 135,939 tons. Almost all the recent increase in stocks was reflected in the amount of pig tin held by the Reconstruction Finance Corporation, which operates the tin smelter for the Government at Texas City, Texas, since all other stocks are minimum working levels, it was noted. Total imports amounted to 87,237 tons.

CHEMICALS FROM SEA WATER

Large Developments of S. African Science and Industry

A SOUTH African company has established a factory near Saldanha Bay to extract and process various salts from sea water, and will soon begin production. The factory will cover an area of about 1000 morgen, and has been designed to supply not only the needs of South Africa for salt and its numerous by-products, but eventually to compete in world markets. The promoters of this new enterprise will at first concentrate on the production of varieties of common salt, and the output is expected to reach 6000 tons a month. It will have the advantage of a high content of iodine, beneficial to health. The second main product which will be derived from the sea water will be magnesium—7000 tons in the first year. This quantity would be sufficient for South African requirements in making substitutes for wood. It will also be used in the foundries for casting fine patterns in iron, brass and other metals. The company will also extract potassium salts from sea water and plans to produce enough not only to supply agriculture, but also the match and other industries. The fourth product of the new factory will be bromine, which will be manufactured in the form of salts and also in its free state. The operations of the company will also include the use of salt extracted from the sea water for the manufacture of substances much in demand in the Union, including caustic soda, soda ash, potassium chlorate, potassium perchloride, bleaching powder and chlorine.

With the advent of atomic energy, graphite has assumed a new significance as an important and strategic factor in atomic piles now operating in Britain and America. What is claimed to be the most modern graphite refining plant in the world has been erected near Krugersdorp. The new plant, owned by the South-West Graphite Mining and Refining Co., is the result of six years' experiments carried out by the company with a pilot plant at Madibi, near Mafeking. It will soon be working to capacity.

* * *

Experiments in rain-making carried out by the Council of Scientific and Industrial Research, the Division of Meteorology and the S.A. Air Force during the first four months of this year appeared to represent a greater advance than had been secured in other countries, said Dr. B. F. J. Schonland, the president of the council. The technique of carrying out experiments of

this kind had been developed and largely mastered, and results had shown that artificial stimulation of precipitation was practicable. Dr. Schonland emphasised that the experiments were in the nature of long-range scientific research. Last summer dry ice was dropped into the super-cooled tops of cumulus clouds on a series of seven flights. The results were observed on a radar cloud-detector built in Johannesburg, and showed that of the 36 cumulus clouds treated with dry ice only four definitely failed to produce rain. The results of eight experiments were indeterminate. Twentyfour clouds produced rain, but only 14 of these produced rain lasting more than 15 minutes. The South African experiments were the first series of systematic experiments on summer convective clouds.

* * *

With up-to-date mining methods and proper transport facilities, the Union can build up a large export trade in vermiculite with the United States. This is the view of Mr. W. S. Steele, a director of Munn & Steele, Inc., of Newark, New Jersey, when in Johannesburg negotiating with existing vermiculite producers for supplies for his own company and other plants in the United States in excess of 100,000 tons a year. Mr. Steele regards vermiculite as one of South Africa's most important mineral resources, and has made a number of suggestions as to how it can best be exploited. The American demands continue to exceed the supply from all sources by a wide margin. The Palabora district, in the Northern Transvaal, has the world's largest proved deposits of high-grade vermiculite ore. A great advantage is the occurrence of huge tonnages of apatite, phosphate bearing ore, in the same region and frequently in the same deposits.

Leather Trades' Chemists

The annual conference of the Society of Leather Trades' Chemists is planned to be held on Friday and Saturday, September 17 and 18, in the Large Chemistry Lecture Theatre of Leeds University. The chair will be taken throughout by Mr. G. Jessup Cuthbush, vice-president of the society. Details are obtainable from Mr. G. H. W. Humphreys, honorary secretary, at the Forestal Central Laboratories, Harpenden, Herts.

Synthetic Mica Threatens Indian Industry

More New Technical Projects

From Our Own Correspondent

THE export to Europe and America of mica blocks, films and splittings from India, the largest producer of this commodity in the world, is threatened by recent developments of mica substitutes produced in Switzerland and the U.S.A. According to Dr. Lal C. Verman, Director of the Indian Scientific Institute, who has returned from a visit to Europe and the U.S.A., manufacturers of electrical machinery there are now making use of silicone-bonded glass cloth in place of mica in some of their products. More important still is the fabrication by a Swiss technologist of "mica powder film," a composition made from cheap powder. A factory is reported to be planned for producing it on a large scale. When commercially available, this mica substitute, it is said, can successfully compete with natural mica in the manufacture of electrical tape. Another serious development is that of synthetic mica, which requires only cheap materials and has reached the stage of pilot plant experimentation. If successful, this process will be capable of producing mica crystals of sufficiently large dimensions to compete with the natural product. The average annual export of mica from India is 11,250 tons valued at Rs.21,700,000, most of which represents hard currency.

Need of Power Alcohol

Shortage of petrol was the greatest handicap in the complete nationalisation of the transport services in the Central Provinces of India, said Mr. T. P. Bhalla, Transport Commissioner of the Province, reviewing the position. They required 2,100,000 gallons a year for their whole scheme to materialise. The present quota of the Province was not sufficient to meet the demand, he said. There were a large number of sugar mills in the Province producing lakhs of tons of molasses. The conversion of these into power alcohol could be easily done, and if the Government harnessed their machinery to produce power alcohol the whole transport problem would be solved.

New Aluminium Industry

The seal of approval has been given by Sir J. C. Ghosh, Director-General of Industries and Supply, Government of India, to the projected aluminium industry scheme in the Central Provinces and Berar, India, over which a controversy has been raging. In commending the scheme, Sir J. C. Ghosh

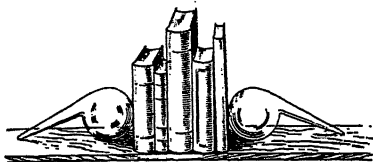
said that he had reason to believe that with certain adjustments, the necessary capital, technical man-power and machinery, the Province could be the largest aluminium producing region, not only in India, but in the whole world. So far as raw materials are concerned, India can supply any quantity of bauxite for the production of aluminium, and the industry has a bright future. Under the suggested scheme the factory will have a production capacity of 5000 tons of aluminium a year and the capital is 3.75 crores of rupees. The Provincial Government has invested 1.5 crores in this project. When the Wainganga River project for generating hydro-electric power to the extent of 600,000 kW in the ultimate stages materialises, says the Director-General, it will be possible to manufacture aluminium at much cheaper rates than now.

Fertilisers in 1950

Work on the fertiliser project at Sindri, India, one of the greatest factories yet planned in Asia, has been greatly accelerated since the beginning of this year. The implementation of the project had suffered a setback in 1946 and 1947 owing to a number of difficulties relating to land acquisition, obtaining the necessary structural requirements, etc., but it is now confidently expected that it will be completed and go into production early in 1950. The factory, estimated to cost Rs.17 crores, will have an annual rated capacity of 350,000 tons of ammonium sulphate produced from gypsum by the semi-water gas project. The Chemical Construction Corporation of the U.S.A. is in charge of its designing while the Power Gas Corporation of the United Kingdom is procuring the plant and erecting it.

Salt Advisory Committee

A committee of four, under the chairmanship of Mr. P. A. Narielwala, of Messrs. Tata Sons, Ltd., has been appointed by the Government of India to advise on measures necessary to place the salt industry on a sound footing. The three other members are Dr. K. J. Mondgill, director of scientific and industrial research, Tranvancore; Rai Bahadur S. C. Das, salt controller of the government; and Mr. D. D. Mithal, director, central waterworks, irrigation and navigation commission. The committee will examine existing methods of salt production in government and privately owned salt works.



A CHEMIST'S

BOOKSHELF

The Vitax Handbook. Second edition. 1948. Vitax Fertilisers, Ltd., Ormskirk, and Rotterdam.

A remarkable conception of the service which a fertiliser manufacturer may render to the horticultural users of its products is represented by this second revised version of this book, which has afforded valuable guidance to large numbers of horticulturists. It is remarkable for two things, the balanced view it presents of horticultural needs, with no disproportionate emphasis of the important part played by artificial fertilisers, and the wide field which it covers. In the eyes of the specialist the book may appear to have attempted too much by seeking to provide a compendium of nearly all the essentials of culture, nutrition, pestology and harvesting of a host of vegetables and fruits. Its saving grace is that each of the wide-ranging chapters is authoritative, extremely practical and many are well illustrated.

* * *

Proceedings of 3rd International Electrodeposition Conference. Published by the Electrodepositors Technical Society, 27 Islington High Street, London, N.1, 1948, 4 to., 216 pp., price to non-members £2 10s.

This book is a comprehensive report of the proceedings of the 1947 London conference organised by the Electrodepositors Technical Society at the Hyde Park Hotel, September 17-21, where there was also an exhibition at which principal British firms were represented. The book constitutes a fitting record of a fine piece of work which should place Britain still more firmly on the map in the important and progressive sphere of electrodeposition. The president of the society, and chairman of the organising committee, Dr. S. Wernick, and all concerned with the arduous work of organisation are to be commended for an achievement which must have had to face many difficulties.

Mr. S. Field, the society's first member and president, and virtually its founder, who received the E.T.S. medal "for services to science, education, and industry," looked back over the 21 years of its existence and was impressed by its growth. Its membership had increased to over 1000 and was world wide. The conference was inter-

national in scope, and included delegates from U.S.A., France, Holland, Belgium, Brazil, Czechoslovakia, Egypt, Finland, India, Italy, Spain, Switzerland and Sweden. The contingents from France and Holland were particularly strong. Australia was represented by Mr. H. E. Arblaster who read a paper on silver-plating in that country.

The first section, on electrolytic polishing of metals, was introduced by a paper by Dr. P. A. Jacquet, the French researcher who was principal inventor and founder of this comparatively new and valuable development. Others in this section dealt with technical and special applications, and the electro-polishing of brass pressings. The next section, on miscellaneous processes, included chemical treatment for zinc surfaces, research organisation in the U.S.A., German electroplating and continental trends, internal stress in copper-plating, and porous chromium coatings. The third and fourth sections had valuable and informative contributions on various processes and the structure of deposits.

* * *

The Identification of Textile Materials. (Handbooks of Textile Technology No. 3.) The Textile Institute, Manchester 3. 5s.

This useful handbook forms a comprehensive summary of the work of the Institute's Committee on the Unification of Testing Methods. There are 14 illustrations and four tables of the properties of different fibres. In a lengthy appendix the chemical properties of manufactured fibres are dealt with and there are descriptions of the available chemical tests. Copies of the tables mounted on boards and suitable for use in the laboratory can be supplied on application to the Textile Institute, 16 St. Mary's Parsonage, Manchester 3, and separate copies of the tables unmounted may also be obtained.

* * *

"Painting as a Pastime," containing reproductions in full colour of Mr. Winston Churchill's paintings in various parts of the world, introduced by his own writings on hobbies and painting, is being produced at the beginning of December by Ernest Benn, Ltd.

Home News Items

Chemical Industry Employment Rises.—

A report just issued by the North-East Development Association states that in the chemical industries of the area employment is higher than before the war and may be expected to increase further after a few years.

1949 I.C.E. Examination.—Application forms, returnable by December 1, and particulars of the associate-membership for 1949 may be obtained from the hon. registrar, Institution of Chemical Engineers, 56 Victoria Street, Westminster, London, S.W.1.

Rubber and Industrial Footwear.—

Following the removal of all footwear from the rationing scheme, the Board of Trade has announced that various restrictions, which required the presentation of a permit for the supply of industrial footwear, have been revoked.

Plastic Wrappers.—Increasing use of plastic hermetically sealed wrappings is being successfully adopted by the Scottish bacon industry. Immediately the hams emerge from the smoke room, they are sealed in the plastic covers and are not touched again until delivered to the consumer.

An Aluminium Bridge.—The first of its kind in the world, a 110 ft. long aluminium lifting bridge weighing 72 tons, built by Head Wrightson and Co., Thornaby, for the River Wear Commissioners, was transported on barges by river to Middlesbrough. The bridge, which is to span the entrance of a dock at Sunderland, will be shipped to the Wear as deck cargo.

Engineering Products from Belgium.—

Most of the 100,000 tons of steel to come from Belgium and Luxemburg during the next three months, under the special arrangement announced by the Treasury as a contribution to easing of trade barriers, will be of highly finished products, for use in the engineering industry. The new importation, it is stated, will not affect the South Wales tinplate industry.

Dollar Earner.—It is claimed that half a million dollars will be earned for the country in 1949 by the development of a new type of bituminous anti-corrosive enamel by Wailles Dove Bitumastic, Ltd., Hebburn-on-Tyne, for use on pipe lines in the Middle East. The firm is spending £50,000 on extensions to be completed by the end of this year to cope with the new development, and they will increase output by 50 per cent. Exports, 60 per cent, of which are to the colonies, will be raised by a further 100 per cent.

Tyre Prices Increased.—Rises in tyre prices from 7½ to 10 per cent came into force on September 1, mainly because of the cost of Egyptian cotton, which is still 50 per cent more than six months ago. Tubes of all kinds and bicycle tyres are not affected.

New Jet Research Station at Burnley?—

The Ministry of Supply is planning to establish factory buildings at Burnley for research and development of jet propulsion. Application has been made to the local council for purchase of land for that purpose.

Coal Output Up.—An increase in British coal production for the first time in nine weeks, marked the end of the holiday season. Output for the week ending September 4 totalled 4,054,000 tons, less than 4,000 tons behind the weekly average required to reach the 211 m. tons set for this year.

Cement Exports.—The overseas demand for British cement is far in excess of present manufacturing capacity, and it is likely that a scheme designed to make more cement available for export will be announced in the near future. At the moment only between one-third and one-half of the calls made for cement can be met.

Aid from the Dollar Countries.—Great Britain's total receipts under the European Recovery Programme had risen to just over \$200 million by the end of August, according to figures released in London last week. Nearly three-quarters of the total, \$141,507,000, was spent in Canada, while commodities produced in the United States accounted for \$27,036,000.

Industrial Production.—The provisional index published by the Central Statistical Office for June is for industrial production as a whole; revision has caused a slight downward adjustment of the general index. Figures for the chemicals and allied trades are given as: 1947 (monthly average) 105; 3rd quarter 105; 4th quarter 117. 1948, 1st quarter (average), 121; 2nd quarter (average) 117. (Average 1946 = 100.)

Petrocarbon Strike Ends.—Following a meeting in Manchester between representatives of Petrocarbon, Ltd., and trade union officials, a joint statement was issued instructing the 600 building workers on strike at the company's refinery plant at Carrington, Cheshire, to return to work on Thursday last week. The strike began on the Wednesday of the previous week following the dismissal of a shop steward. The statement said that it had been agreed that the dismissed employee should be re-employed as a rigger.

Technical Publications

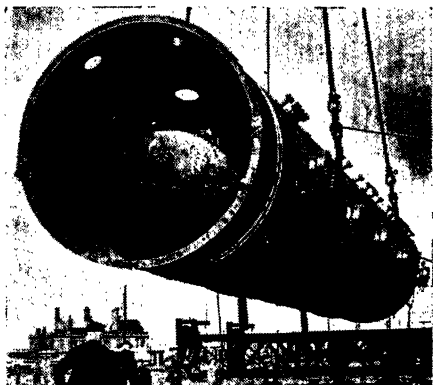
RECENTLY prepared and issued by Price, Stutfield & Co., Ltd., 110 Fenchurch Street, London, E.C.3, in collaboration with Koch & Reis, S.A., Antwerp, is a 28-page booklet on "Sulphur and Special Products for Plants." This contains a good deal of matter of technical interest, covering a wide range of products, with descriptions of their composition and application. There are, as well, chapters dealing comprehensively with such subjects as "The Use of Sulphur as a Fertiliser," "Sulphur as a Plant Tonic," and "Sulphur as a Phytopharmaceutical Product."

* * *

A wall chart giving the characteristics and physical constants of the many surface-coating resins produced by Erinoid, Ltd., of Stroud, in association with A. Boake Roberts & Co., Ltd., and sold only by them, is being distributed by the latter company to users in the paint and associated industries. This chart presents in respect of more than 70 resin products essential data of colour, clarity, acid value, melting range, maximum ash percentage and solubility in oils and in spirits.

* * *

The Chemical Division of the Koppers Company, Inc., has made available a recently issued technical bulletin describing



Unloading at Victoria Dock, London, a 153-ton, 71 ft. 6 in. de-asphalting tower made by the M. W. Kellogg Company, of New York. Originally destined for Anglo-Iranian at Haifa, the tower, of 2½ in. plates and 13 ft. 5 in. in diameter, will now be incorporated in a U.K. refinery's equipment

the properties, uses, and chemical reactions of Di-tert-butyl-meta-cresol. This alkylated tar acid is of interest to members of the rubber, synthetic resin, perfume, fat and soap, and petroleum industries. A high-boiling solid phenolic compound, it is soluble in the common organic solvents, but is essentially insoluble in aqueous alkaline solutions. DBMC is used in production of sulphide derivatives which are effective reclaiming agents for synthetic rubber; in the compounding of rubber; in resins and plasticisers; and in the production of certain perfume intermediates. The bulletin includes technical information about the properties of the compound, and a discussion of its uses and chemical reactions

* * *

Three new types of dry-concentrating developed by the U.S. Bureau of Mines for separating ores not amenable to ordinary ore-dressing treatment are described in Report of Investigations 4286. The new equipment is designed to separate ores primarily on the basis of their shape and size rather than their specific gravity or weight. In describing the structure and operation of each of the concentrating machines, the publication points out that they have been successfully employed on an experimental scale in the separation of such minerals as vermiculite, graphite, molybdenum, kyanite, and chromite. Results of the experimental studies, as well as photographs and mechanical drawings of the new equipment, are obtainable free from the Publications Section, 4800 Forbes Street, Pittsburgh 13, Pa.

* * *

The Lead Industries Association, 420 Lexington Avenue, New York, 17, has published a booklet, "A Medical View of the Lead Problem," which contains reprints of papers on important aspects of health safeguards in the lead industry. The responsibilities of the employer, employee and the general public are outlined, and a series of ten conclusions, resulting from prolonged investigation, are presented. Among a number of interesting articles are two by an industrial hygienist giving his view on the medical and engineering problems associated with the prevention of lead intoxication. Copies are obtainable from the association, price 50c.

Efficient Water Treatment

Economical Automatic System

USING a specially designed demineraliser employing the ion exchange principle, the J. T. Baker Chemical Company, Phillipsburg, New Jersey, is stated to have reduced the cost of producing mineral-free water from approximately \$5,000 to \$0.265 per 1000 gallons. Since the treated water is used in the manufacture of virtually all of the company's analytical reagent chemicals and acids, the specifications set for the water are stringent: a total ionised solids content of not more than four parts per million. The raw water available at the plant contains a total of 151 p.p.m., 17 of which are silica. The rate required was 6700 gal. per hour.

The equipment used (installed by the American Cyanamid Co.), a multi-bed system, is interesting for the full use it makes of the automatic control principle. Air-operated diaphragm valves are automatically operated from a central control panel; an alarm sounds when the treated water falls below the specified standard and a conductivity controller affords an additional check; solenoid valves automatically shut down the entire system when storage tanks are full and divert any sub-standard water when operations are resumed.

The operating costs of \$0.265 per 1000 gal., include the water charges.



Convenient layout of "Filt-R-Still" showing closely adjacent mechanism and control panel

PERSONAL

AT the invitation of the Insecticides Committee appointed by the Colonial Office, MR. L. W. LEYLAND COLE, 45 year-old chief agricultural chemist for the Shell Petroleum Co., Ltd., in London, and formerly for 15 years senior lecturer in agricultural chemistry at Wye College, London University, is leaving next week for East Africa. He will visit Kenya, Uganda, Tanganyika and the Sudan to study the problem of devising new means for combating tsetse flies, mosquitoes and other insects which have prevented the cultivation of large tracts of colonial territories. He will use fixed wing and helicopter aircraft for "fog-spraying" infested areas with oil-base solutions and synthetic chemicals.

MR. H. CONSTANT has been appointed Director of the Ministry of Supply's National Gas Turbine Establishment in succession to DR. ROXBEE COX, who is to take up an appointment with the Ministry of Fuel and Power. Mr. Constant, a deputy director of the National Gas Turbine Establishment, which is concerned with research and experimental work for military and civil purposes, took up his new appointment last week.

NEXT WEEK'S EVENTS

WEDNESDAY, SEPTEMBER 8 to WEDNESDAY, SEPTEMBER 15

British Association for the Advancement of Science. Brighton. 110th Annual meeting.

FRIDAY, SEPTEMBER 17 and SATURDAY, SEPTEMBER 18

Society of Leather Trades' Chemists. Large Chemistry Lecture Theatre, University, Leeds, 9.30 a.m. Annual general meeting and conference. Friday, 2.0 p.m. G. S. Adair: "Recent Work on Osmotic Pressures, Membrane Equilibria and Solubility Factors of Protein in the Light of the Work of Procter." (Third Procter Memorial Lecture.)

SATURDAY, SEPTEMBER 18 and SUNDAY, SEPTEMBER 19

Aslib. Ashorne Hill, near Leamington Spa, Warwickshire, 10.0 a.m. 23rd Annual conference.

SATURDAY, SEPTEMBER 11. to SUNDAY, SEPTEMBER 19

Société de Chimie Industrielle, of Paris. Brussels. 21st International Congress of the Chemical Industry

Overseas News Items

Mexican Oil Payment Confirmed.—President Miguel Aleman, of Mexico, has confirmed that the first instalment of compensation for the expropriation of British oil properties in Mexico will be paid on September 18.

U.S. Petroleum Price Drop.—Slackened demand, stock accumulations, the continued high rate of U.S. refining operations and a generally more optimistic supply outlook, have been listed as reasons for the falling prices of petroleum on the Gulf open market.

Norway's Only Refinery To Be Rebuilt.—The only refinery in Norway, situated at Valloc in the southern part of the country, which was totally destroyed during the war, is to be rebuilt as soon as possible. Its capacity will be the same as before, 30,000 long tons of crude oil.

U.S. Magnesite and Magnesia.—Output of crude magnesite in the U.S.A. in 1947 totalled 375,993 short tons, according to reports of producers to the Bureau of Mines. This production was more than double the 1937-39. Caustic-calced magnesite decreased 27 per cent from 1946 whereas refractory magnesia established a new peak of 314,921 short tons, 4 per cent more than the previous record made in 1943.

Australian Petrol Cuts.—The Prime Minister, Mr. Chifley, has announced petrol cuts of 20 per cent for private motorists and 10 per cent for other users as from October "to conserve petrol for defence." Mr. Chifley, said stocks were down to 60 per cent of pre-war. Not only the dollar but the world supply position was becoming "increasingly difficult." The Cabinet had also decided to conserve aviation petrol in civilian use and to build up stocks for both naval and civil purposes.

S. American Plastics.—A plant for the manufacture of plastic articles for domestic and industrial uses will shortly be completed in S. Paulo by De La Rue Plásticos, S.A., an Anglo-Brazilian "mixed" company, affiliated with the British De La Rue undertaking. The installation of the factory, the largest of its kind in South America, was begun in 1945; presses and other equipment have been shipped from Great Britain and operations will be under the technical supervision of experts from the parent company. It is understood that insulators and other electrical fittings, telephone sets, wireless cabinets, dashboard panels, cameras, combs, trays, etc., will be among the articles to be produced.

U.S. Oil Supply Estimates.—Leading economists of the United States oil industry estimate that oil supplies in the United States will be sufficient to meet the record consumer demands next winter and in the first quarter of 1949.

New Furnace for Ferro-Alloys in S.A.—In their annual report, the African Metals Corporation announce the intention to construct another furnace for ferro-alloys on a new site near Meyerton, Transvaal, to which the company's furnaces at Vereeniging will be gradually transferred.

Atomic Energy Control in South Africa.—The South African Senate has passed a Bill giving the State complete monopoly and control of the exploitation and treatment of radio-active materials and the generation of atomic energy, and providing for the establishment of an atomic energy board.

U.S. Native Sulphur Production.—Production of native sulphur in the United States in June, 1948, continued at a very high rate, according to reports of producers to the U.S. Bureau of Mines. During the first six months of 1948 more sulphur (2,394,509 long tons) was produced than in any similar previous period. Sales were also at a record level and stocks declined by 67,050 tons to a total of 3,303,984 tons.

Chilean Copper Decree.—The Chilean Ministry of the Treasury has issued a decree authorising the sale of Chilean copper products to countries unable to pay in dollars, according to a report from New York. The decree, it is stated, allows for the export of copper products in semi-finished or finished form and includes products in which copper alloys are used. It is believed the measure will favour especially Argentina, Spain, Italy and France, as these countries may pay in their own currencies under conditions, the despatch added.

Canadian Titanium Discovery.—A huge deposit of titanium, which, it is claimed, may prove to be the world's largest, has been discovered in Eastern Quebec. First announcement of the find was made by Premier Maurice Duplessis, of Quebec, who disclosed plans for a \$25 million project to develop the deposit. A Federal Government spokesman said the discovery would have a tremendous influence on Canada's mining future, and put it in the same class "as the discovery of gold." The ore, discovered near Lake Allard, 400 miles north-east of Quebec City, is refined into a metal for high-grade alloys and pigments for paints.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

JENCONS (SCIENTIFIC), LTD., London, E.C. (M., 11/9/48.) August 5. debenture to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank: general charge. *Nil. January 13, 1948.

Company News

The British Malayan Tin Syndicate proposes to increase its capital from £50,000 to £110,000.

The directors of Boots Pure Drug Company, Ltd., have declared an interim dividend of 10 per cent, less tax, for the half-year ending September 30, 1948.

The directors of The Distillers' Co., Ltd., recommend the payment of a final dividend on the ordinary stock of 3 3/5d. per 4s. unit, less income tax, for the year ended March 31, which, if approved, will be paid on October 26. The seventy-first annual general meeting of the company is to be held on September 24.

At the twenty-eighth annual general meeting of British Glues & Chemicals, Ltd., it was reported that the consolidated profit and loss account showed a consolidated profit for the year amounting to £113,606 after the charges shown in the account and after providing for all taxation. The corresponding figure for last year was £104,514. The net dividends authorised by the directors amount to £28,875 on the preference stock and £24,062 on ordinary stock, leaving £41,812 to be carried forward in the balance sheet.

Chemical and Allied Stocks and Shares

ALTHOUGH slightly more active, industrial shares have been characterised by small irregular movements, the tendency having been to follow proceedings at the TUC for any indications of Government policy. It is now admitted that the dividend limitation request has been loyally followed

by all important industrial companies, and no legislation for limiting profits and dividends is expected. It is clear, however, that the new production drive may have repercussions on many classes of companies whose business is entirely in the home market. British Funds have been in renewed demand, 3 per cent Transport stock touching the new high level of 99 1/16.

Imperial Chemical eased to 44s. 6d. and the new shares were also easier at 3s. 1 1/2d. premium, the latter being sold by those not wishing to take up their "rights," the last day for which is September 14, when the first call of 20s. is payable. After that date the new shares are expected to attract increased demand because they are a cheaper purchase than the old shares, and the directors have stated that they anticipate being able to maintain the 10 per cent dividend total in future on the increased capital. The final call on the new shares is 20s. 6d. (the issue price being 40s. 6d.) and is not due until October 28.

Fisons have changed hands up to the higher level of 59s., Laporte Chemicals 5s. units were 20s. 6d., Amber Chemical 2s. shares 9s. 6d. and Albright & Wilson 5s. shares 28s. 7 1/2d. Greiff-Chemicals Holdings 5s. shares were around 14s. 6d. Moreover, William Blythe 3s. shares held their rise to 18s. 9d., and Blythe Colour 4s. units were firm at 60s. In other directions, Erinoid 5s. ordinary have been more active around 11s., reflecting hopes that the dividend may be maintained. Glaxo Laboratories changed hands around the higher level of £18, Burt Boulton were 26s. 3d. and Ilford 5s. ordinary more active around 26s. Elsewhere, A. Boake Roberts improved to 30s.

British Aluminium at 47s. 6d. have been firm with British Oxygen 99s. 4 1/2d., Borax Consolidated 59s. and Amalgamated Metal (19s. 3d.) were slightly higher on balance. Firmness was shown by Turner & Newall (77s. 6d.) and United Molasses (48s. 6d.) while in response to the strength of the consolidated accounts, the units of the Distillers Co. firmed up to 27s. 3d. British Plaster Board 5s. ordinary were 25s. 3d. Goodlass Wall 10s. ordinary 36s., Pinchin Johnson 54s. 6d. and International Paint in their new form of 4s. units have changed hands around 31s. 9d. Coalite & Chemical 2s. ordinary strengthened to 4s. 1 1/2d.

Colliery shares were good on latest marked estimates of "break-up" values, with Staveley advancing strongly to 80s. 6d. on the full results and chairman's annual statement. In particular, the market is still hopeful that the proposed capital return by Doncaster Amalgamated Collieries (in which Staveley has a large interest) may mean a

special payment in future for Staveley shareholders. Iron and steel shares were also better where changed, Stewarts and Lloyds being 55s. 4½d., Colvilles 33s. 9d. and Dorman Long 30s. 9d. Moreover, still helped by the strength of the balance-sheet, and the chairman's annual review, Guest Keen rose afresh to 49s. 3d. Ruston & Hornsby moved up to 54s. 9d.

Boots Drug, were 52s. 9d., reflecting the easier tendency in shares of companies with important retail interests—in evidence since the T.U.C. request for further price cuts. Beechams deferred were better at 20s. and Griffiths Hughes have risen to 36s. 3d. Oil shares were easier inclined, Shell being 76s. 1½d. and Anglo-Iranian £8½.

British Chemical Prices

Market Reports

PRESSURE for supplies has been reported from practically all sections of the industrial chemicals market and contract deliveries are being taken up to the fullest extent. Buying for export has been on a good scale and a fair number of inquiries for shipment remain in circulation. The soda products are in steady request, particularly the alkalis and a tight supply position continues for most of the potash compounds. The coal-tar products market is unchanged.

MANCHESTER.—With the approaching end of the holiday season, trading conditions on the Manchester chemical market during the week have been less under the influence of seasonal factors and reports generally point to a steady flow of inquiries from home consumers, covering a wide range of both light and heavy materials. Existing orders are being drawn against satisfactorily and replacement buying has been on a fair scale. The general run of alkali products, as well as the potash, ammonia and magnesia chemicals, are wanted in good quantities by domestic users, while shippers are maintaining interest on export account. Most of the tar products are also meeting with a brisk demand.

GLASGOW.—Business during the week in the Scottish chemical market has been fairly well maintained, and the volume of orders received covered a varied range of chemicals. Prices also have remained fairly steady. The export market is still very active, and numerous inquiries have been received and a considerable amount of business has resulted. An increase in the number of offers from continental suppliers has also been noted.

AMERICAN METALLURGY

A NEW educational manual entitled "Copper-base Casting Alloys" has been published by Federated Metals, division of American Smelting & Refining Company, 120 Broadway, New York 5. The illustrated 52-page book deals extensively with the practical application of copper-base metallurgy. It also includes a compilation of standard industry specification tables and covered in the text are thermal effects, shrinkage, porosity, gas porosity, and various behaviour characteristics of high copper alloys, tin bronzes and red brasses, nickel silver, aluminium bronze, silicon bronze and silicon brass.

The results of two series of co-operative industrial tests designed to establish the value of electrolytic manganese in steel-making are described in a publication by the Bureau of Mines, R.I.4303. Most of the tests were made in an experimental open hearth furnace. Comparative results of the steel qualities of various heats and other technical data are included in the Bureau report, a free copy of which may be obtained from 4800 Forbes Street, Pittsburgh 13, Pa.

Purchase Tax on Soap Substitutes.—The Commissioners of Customs and Excise have drawn the attention of registered traders to the fact that shampoos are chargeable with purchase tax at the rate of 33½ per cent of the wholesale value. This charge is regarded as applying to soap substitutes, liquid, solid or paste, which are put up with any implication that they are intended for use as shampoos, whether or not they are claimed to be "bases" or concentrates requiring further preparations before use as shampoos. Soap substitutes which are put up with no claims or statements as to use for toilet purposes or which are put up specifically and exclusively as household cleansers are not chargeable with tax.

Manchester Oil and Colour Chemists.—The Manchester Section of the Oil and Colour Chemists' Association has arranged for Friday afternoon, September 24, a visit to the seed crushing and oil refining works of J. Bibby & Sons, Ltd., at Great Howard Street, Liverpool 3. In the evening, the section will hold a meeting of members in the Lecture Theatre, Chemistry Building, Liverpool University, at which a paper is to be read by Professor Hilditch entitled "Current Work at the University of Liverpool on Potential Sources of Drying Oils." The annual dinner and dance of the Manchester Section is to be held on October 29 at the Grand Hotel, Aytoun Street, Manchester 1.

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2, at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Manufacture and purification of cellulose esters of higher fatty acids.—J. J. Allen, and J. A. Hawkes. Jan. 23, 1946. 605,912.

Manufacture of substituted benzhydryl ethers.—E. P. Newton (Parke, Davis, & Co.). Jan. 29, 1946. 605,915.

Manufacture of substituted benzhydryl ethers.—E. P. Newton, (Parke, Davis, & Co.). Jan. 29, 1946. 605,916.

Manufacture of substituted benzhydryl ethers.—E. P. Newton, (Parke, Davis, & Co.). Jan. 29, 1946. 606,158.

Stable dispersions of secondary aromatic amines.—E. I. Du Pont De Nemours & Co., and B. M. Sturgis. Feb. 1, 1946, 605,918.

Process for the production of coumarins.—Ward, Blenkinsop & Co., Ltd., and H. G. Dickenson. Feb. 7, 1946. 605,999.

Production of furfuryl alcohol.—Imperial Chemical Industries, Ltd., F. Starkey, and J. G. M. Bremner. Feb. 26, 1946. 605,922.

Process for the manufacture of halogenated naphthoquinoneimides.—P. May, (Sandoz, Ltd.). March 11, 1946. 606,088.

Trimeric alpha methyl para methyl styrene and method of making the same.—Standard Telephones & Cables, Ltd. June 4, 1945. 606,085.

Heat-exchangers.—Power Jets (Research and Development) Ltd., and R. D. Van Millingen. March 17, 1946. 606,086.

Insect-repellents or insecticides.—C. V. Chemische Fabriek Rids. Sept. 7, 1942. 606,087.

Manufacture of interpolymers of styrene with polyhydric alcoholic mixed esters and of coating compositions obtained therefrom.—L. Berger & Sons, Ltd., Petrocarbon, Ltd., L. E. Wakeford, D. H. Hewitt, F. Armitage, and H. Steiner. Sept. 2, 1946. (Addition to 573,809.). 605,929.

Injection moulding of resinous compositions.—British Resin Products, Ltd. Feb. 8, 1945. 606,259.

Di-substituted hexane.—Lederle Laboratories, Inc. April 1, 1944. 606,261.

Collagenous strands, and method of making the same.—American Cyanamid Co. March 20, 1944. 606,427.

Substituted diamines.—Soc. Des Usines Chimiques Rhone-Poulenc. June 22, 1943. 606,181.

Preparation of substituted diamines.—Soc. Des Usines Chimiques Rhone-Poulenc. Jan. 19, 1944. 606,182.

Substituted diamines.—Soc. Des Usines Chimiques Rhone-Poulenc. Sept. 19, 1943. 605,187.

Solid hypochlorite-containing compositions.—W. H. Langwell. Aug. 20, 1945. 606,431.

Derivatives of propanoic acid and processes of preparing the same.—Merck & Co., Inc. Sept. 16, 1944. 606,188.

Thiophene compounds, and processes of preparing the same.—Merck & Co., Inc. Sept. 16, 1944. 606,189.

Thiophene compounds, and processes of preparing the same.—Merck & Co., Inc. Sept. 16, 1944. 606,190.

Thiophene compounds, and processes of preparing the same.—Merck & Co., Inc. Sept. 16, 1944. 606,191.

Thiophene compounds, and processes of preparing the same.—Merck & Co., Inc. Sept. 16, 1944. 606,192.

Thiophene compounds, and processes of preparing the same.—Merck & Co., Inc. Sept. 16, 1944. 606,193.

Thiophene compounds, and processes of preparing the same.—Merck & Co., Inc. Sept. 16, 1944. 606,194.

Thiophene compounds, and processes of preparing the same.—Merck & Co., Inc. Sept. 16, 1944. 606,195.

Biotin, and processes of preparing the same.—Merck & Co., Inc. Sept. 16, 1944. 606,196.

Propanoic acid derivatives and processes of preparing the same.—Merck & Co., Inc. Sept. 16, 1944. 606,197.

Thiophene compounds, and processes of preparing the same.—Merck & Co., Inc. Sept. 16, 1944. 606,198.

Biotin, and processes of preparing the same.—Merck & Co., Inc. Sept. 16, 1944. 606,200.

Platinum group metal catalysts.—American Platinum Works. Feb. 2, 1942. 606,348.

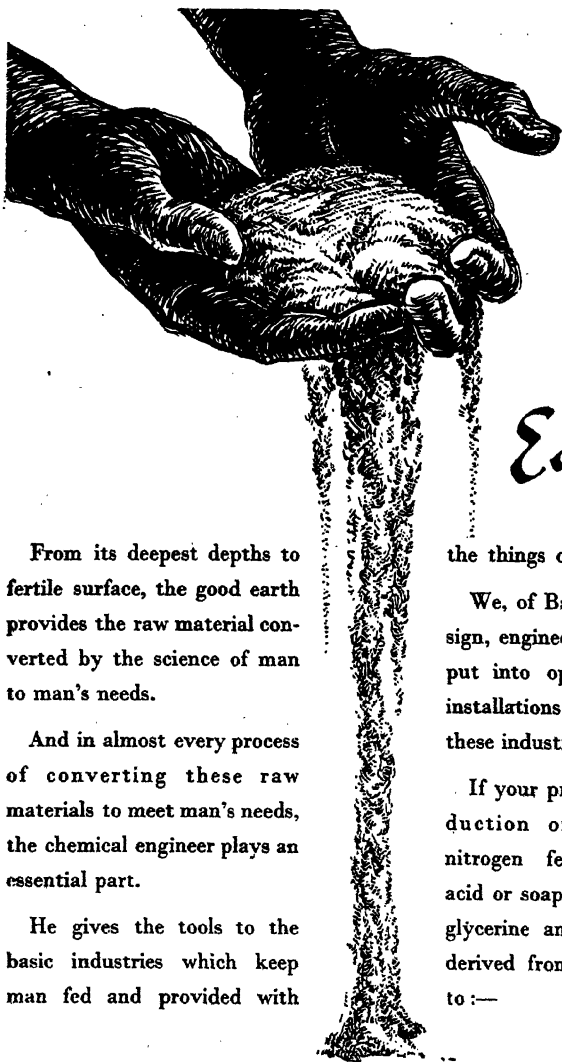
Production of polymers and copolymers comprising trifluoroethylene.—E. I. Du Pont De Nemours & Co. Sept. 19, 1944. 606,273.

Manufacture of complex granulated fertilisers.—Soc. Anon Des Manufactures Des Glaces Et Produits Chimiques De St.-Gobain, Chauny, & Cirey. Oct. 18, 1944. 606,442.

Water carbonating devices.—Coca-Cola Co. Jan. 15, 1942. 606,531.

Diesel engine fuels.—R. T. Pollock. Jan. 20, 1945. 606,212.

Insecticidal compositions.—Westinghouse Electric International Co. Jan. 11, 1945. 606,218.



The Good Earth

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5A

Concentration of organic substances.—Distillation Products, Inc. Feb. 23, 1945. 606,230.

Treatment of the surfaces of articles made of aluminium or its alloys.—Compagnie De Produits Chimiques Et Electrometallurgiques Alais, Froges, & Camargue. Feb. 10, 1945. 606,240.

Treatment of the surfaces of articles made of aluminium or its alloys.—Compagnie De Produits Chimiques Et Electrometallurgiques Alais, Froges, & Camargue. Feb. 10, 1945. 606,241.

Preparation of organo-silicon polymers.—C. Shaw, W. E. Smith, and H. G. Emblem. Jan. 11, 1946. 606,301.

Method of obtaining fat or oil, and feeding meal from fish, fish offal and the like.—Aktieselskabet Stord, and O. Notevarp. Jan. 26, 1942. 606,304.

Polymerisation of vinylbiphenyl.—General Aniline & Film Corporation. Dec. 30, 1944. 606,364.

Process for the surface protection of metals.—Walterisation Co., Ltd., and W. I. Walters. Jan. 14, 1946. 606,381.

Manufacture of moulded resins.—Lonza Electric & Chemical Works, Ltd. Jan. 15, 1945. 606,384.

Production of magnesium base die casting alloys.—Bendix Aviation Corporation. Jan. 31, 1945. 606,399.

Heating and reheating of ferrous metals.—J. Miles & Partners (London), Ltd. and A. G. E. Robiette. Jan. 14, 1946. 606,401.

Esters, and process for making them.—Carbide & Carbon Chemicals Corporation. Feb. 6, 1945. 606,407.

Production of sodium bicarbonate, and ammonium chloride.—W. Reinders. Jan. 14, 1942. 606,456.

Method for the production of esters of diols and triols of cyclopentane-polyhydrophenanthrene series.—Lovens Kemiske Fabrik ved A. Kongsted. Jan. 29, 1942. 606,480.

Purification of penicillin salts.—Glaxo Laboratories, Ltd., E. L. Smith, and A. E. Bide. Jan. 23, 1946. 606,482.

Manufacture of substituted benzhydryl ethers.—E. P. Newton (Parke, Davis & Co.). Jan. 29, 1946. 606,317.

Production of carbon monoxide.—Imperial Chemical Industries, Ltd., G. Nonhebel, and M. H. M. Arnold. Feb. 15, 1946. 606,321.

Ferrous metal articles coated with aluminium or aluminium-base alloy.—H. W. K. Jennings (Al-Fin Corporation). July 5, 1944. 606,330.

Production of magnesium, and apparatus therefor.—Honorary Advisory Council for Scientific and Industrial Research. Dec. 18, 1941. 606,637.

Apparatus for the recovery of volatilisable metals.—Honorary Advisory Council for Scientific and Industrial Research. Dec. 18, 1941. 606,638.

Apparatus for the recovery of volatilisable metals.—Honorary Advisory Council for Scientific and Industrial Research. Dec. 18, 1941. 606,639.

Direct production of ductile magnesium.—Honorary Advisory Council for Scientific and Industrial Research. Jan. 13, 1942. 606,640.

Method and apparatus for producing magnesium.—Honorary Advisory Council for Scientific and Industrial Research. Feb. 5, 1942. 606,641.

Apparatus for producing magnesium by thermal reduction.—Honorary Advisory Council for Scientific and Industrial Research. Feb. 21, 1942. 606,642.

Vacuum apparatus for producing magnesium.—Honorary Advisory Council for Scientific and Industrial Research. March 9, 1942. 606,643.

Apparatus for producing magnesium.—Honorary Advisory Council for Scientific and Industrial Research. April 30, 1942. 606,644.

Methods for the oxidation of saturated aliphatic hydrocarbon gases.—Clark Bros. Co., Inc. Oct. 24, 1942. 606,554.

Separation of narrow boiling hydrocarbon fractions.—Anglo-Iranian Oil Co., Ltd., S. F. Birch, J. Habeshaw, and C. B. Collis. Dec. 5, 1944. 606,797.

Production of pure hydrocarbons from petroleum naphtha, and other hydrocarbon feedstocks.—Anglo-Iranian Oil Co., Ltd., S. F. Birch, J. Habeshaw, and R. A. Lowry. Dec. 30, 1944. 606,798.

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Why Work?

THE marked preference exhibited in so many quarters just now for using euphemisms, or at the least abstractions, in public discussion of the harsh facts of national recovery seems to be something more than a coincidence. Even the Chancellor of the Exchequer, it will be recalled, lately telling the Trades Union Congress more bluntly than almost any of his colleagues would care to do that harder work or more of it was the only means of attaining a fuller scale of living, had to resort to the now aged analogy of dividing the cake. It is almost axiomatic that generalisations of the sort which abound when the question of getting more work done is discussed on a national level are taken to apply to everybody—and to nobody in particular. It is, then, not altogether surprising when there is no recognisable response such as can be evoked by presenting an incentive in terms of £s.d.

Nearly every chemical employer nowadays appears to have a clearer grasp of the problem of getting more work done cheerfully than has almost any member of the Government, and the organisations promoting this which have been built up within many of the large chemical undertakings are extraordinarily effective. In striking contrast, half the measures applied at Government level, from which come most of the exhortations to work harder, act as powerful "disincentives."

The most conspicuous example is, of course, the retention of a scale of income

tax which is almost penal. The man who lately worked over the week-end on an urgent repair job, earning £4, from which 30s. was deducted as tax, expressed, when he received his pay the philosophy which thousands are adopting—"Never again." The financial incentive to hard work has been removed or reduced materially for all sections of the community. The business men, the executives, know that only by hard work can we retain even our present somewhat attenuated standard of living. These men may have no incentive in the shape of increased income (since the State extracts much from whatever they may earn, sometimes at the rate of 19s. 6d. in the £), but they have the incentives of personal achievement and the knowledge of the penalties of failure. The workman, for all the assurances of his trades union leaders that he is fit to sit on boards of directors, is seldom gifted with as clear a conception of what is at stake. People as a whole need something more tangible, as, for example, a military defeat with imminent invasion to arouse an equivalent devotion to the job in hand.

We have been told that Sir Stafford Cripps has now concluded that his "work more" propaganda campaign has not been a success. Of course it has not. Everyone, from bottom to top, has had a surfeit of propaganda. Some very good and obvious reason must be given for hard work, some carrot must be put before the donkey's nose. World economics is cer-

On Other Pages

<i>Leader:</i>				<i>A New Fungicide</i>	378
<i>Why Work?</i>	371			<i>Paper from Straw</i>	378
<i>Notes and Comments:</i>				<i>Effects of Atom Bomb</i>	378
<i>Ending Waste</i>	373			<i>U.K. Coal Research</i>	379
<i>Atomic Standards Bureau</i>	373			<i>Continental Shale Oil</i>	379
<i>Technology Undeveloped</i>	373			<i>Steel Supplies for Industry</i>	380
<i>Careers in the Far East</i>	374			<i>Steel Defence Campaign</i>	380
<i>Radioactive Elements</i>	374			<i>Another Record Broken</i>	380
<i>Rising Chemical Totals</i>	375			<i>Science and World Affairs</i>	381
<i>U.S. Production Continues to</i>				<i>German Analytical Practice</i>	384
<i>Increase</i>	375			<i>Conservation of Vital Materials</i>	385
<i>Radioactive Isotopes</i>	375			<i>Electrodeposition Principles in</i>	
<i>Dust in Industry</i>	376			<i>Analysis</i>	386
<i>Specialised Photography</i>	376			<i>British Exhibition in Copenhagen</i>	390
<i>Metal and Mining Conference</i>	376			<i>A New Glass Pump</i>	395
<i>Ceramic Congress</i>	376			<i>Chemical Trade Prospects in</i>	
<i>German Plant "Reprieved"</i>	377			<i>Pakistan</i>	398
<i>Dutch-German Agreement</i>	377			<i>Fertilisers in Italy</i>	398
<i>Letter to the Editor</i>	377			<i>Pyrethrum Experiment</i>	398
<i>Continuous Fertiliser</i>	378			<i>Nitroglycerine Explosion</i>	400

tainly not the working man's carrot. Until the Government reduces its expenditure and relieves the tax burden so that incentives can again appear, there will be no general return to hard work, nor even to a fair day's work.

This aspect of the problem of production may be regarded by some as having limited application. Most jobs are not to be rated on "contract price" terms, which are the most effective means of getting work done quickly. What of the factory or chemical works in which the only possible method of payment is a weekly wage plus overtime? Here the financial incentive operates too, but it need not be the only one. The gas industry seemed to have found the means to contentment and hard work through the co-partnership movement. A short-sighted Government proposes to abolish this principle under nationalisation. Trades union leaders are asking that the workers should be given a share in management; co-partnership is an ideal way of doing this and of providing incentives in the form of dividends for successful work.

Politicians now demand more and more frequently that the worker should be consulted by his employers on production matters. There is psychological value, at least, in this suggestion. We all like to think we are important, and to be consulted in regard to our work provides a wonderful fillip. The system of setting up

works production committees in which the proposals of the workers can be brought to the notice of the management, with joint planning of factory routine, has much to commend it. The workers in a factory know a great deal about their jobs, and can provide much criticism that is of value. Let them do so. That is one way to contentment, as well as economies. But to maintain, as some now do, that those who work at the bench, or operate the processes in the works, have sufficient knowledge and background required to shape successful industrial policy is patently absurd.

The problem of getting the rate of production we need is primarily a problem of incentive, and it is as well to recognise at once that the goods must first be delivered. The miners, it will be noted, seem to have secured all that they have sought for years; but the introduction of machinery, which should lead to greater output, seems to have produced little practical benefit to any but the miners. In proportion to the extra work done by the machine, the workers have done less; that is all we have achieved. It is hard to evade the unpleasant conclusion that for many the only infallible incentive is fear of losing one's job? If finally we prove to be unable to match America's production per man-shift until we have a million unemployed there will be no cake or talk of cakes. That fact cannot be disguised much longer.

NOTES AND COMMENTS

Ending Waste

IF the full development of science and a balanced world economy could be assured by the exchange of ideas alone the distinguished gatherings convened in Brighton by the British Association from September 8 to 15 should have solved a host of problems. None of the many leaders in the various branches of science who participated, has, however, suggested that amelioration in any sphere is likely to be produced by scientific means alone, much less by intellectual exercises, and few have failed to stress that the grossly wasteful industrial and scientific economy of the past still has lineal successors in present-day practices—the prodigal use of aluminium and the free emission of sulphur were among the examples quoted—and that such unimaginative policy, especially in the realm of food supplies, may call down a fearful penalty. This awareness that, in the long view, virtually nothing is inexhaustible is comparatively a new conception which scientists have a duty to make known as widely and as quickly as they can. Early discussions of the venerable British Association, whose background the president, Sir Henry Tizard, so realistically recalled, would have dismissed the idea with derision. Whether in the U.S.A. even now much attention would be paid to the doctrine of conservation, except perhaps in regard to mineral oil, is extremely doubtful. To that extent this country has learned under the impact of many scarcities a lesson which it has a duty to impart to others before the bottom is reached in some of the great natural storehouses of the world.

Atomic Standards Bureau

ONE hundred research institutes in 15 countries are stated now to be making reports to the U.S.A. on the results accruing from the use in their own science departments of the radioactive isotopes derived from the atomic energy laboratories at Oak Ridge, Tennessee, which were until comparatively recently the only source of these important new tools of investigation in many fields. The United Kingdom, which is still shown in the American returns as one of the 21 recipients around the world, now fortunately has an in-

creasingly useful source of its own supply at the AER Establishment, Harwell, which, it is hoped, may before long be able to confer the same sort of benefits over a similarly wide field and reap corresponding advantages from foreign research. Meanwhile, the U.S.A. has clearly gained a handsome start in this department of science. One index of this is the news from Washington that the U.S. Atomic Energy Commission is building now in New Jersey an atomic standards bureau, with laboratories costing about £250,000, to ensure that the radioactive products now being more and more widely distributed in America, and soon to industry as well as to science, do not fall below the high standards achieved at the start. Here some 65 scientists will be employed, unproductively but no less usefully than any in the AEC establishment, ensuring that the materials produced for and in the atomic furnaces, such as uranium, radioisotopes, chemical compounds and equipment, are of the highest purity and quality attainable under present conditions. Thus research and use of the new radioactive aids in America gain a watchdog comparable with the older U.S. Bureau of Standards in Washington, to which their science and industry alike owe a great debt.

Technology Undeveloped

DESPITE the welcome acceleration in the tempo of atomic development revealed during the course of this year, the widespread use of the newer forms of radioactive material is fairly certainly not to be expected for some years, at least. Very few indeed are competent to forecast when those powerful influences will begin to have their effect on industry and science in this country, and those few are, under present prohibitions, not the most communicative. Because of that uncertainty and continuing secrecy the number who can be trained in the principles which will enable them to carry on the great work must be extremely small, notwithstanding the gradual widening of the facilities being provided at Harwell. Even fewer, unfortunately, are those who are being equipped with the technology which may suddenly be needed on a wide scale to take full

advantage of the gifts which radioactive elements could confer in the chemical and metal industries alone. In that connection, too, the U.S.A. looks like enjoying an enviable advantage in possessing a fairly large body of industrial scientists who were associated with the atom bomb project and are qualified to interpret their knowledge into terms of industrial use. Typically, some of these already are advertising the industrial services they are prepared to offer, although at the moment that stage has not been reached even there.

Careers in the Far East

NEARLY all the chemical and food industries and a good many of the metal enterprises here and elsewhere in Europe are still handicapped by the small scale of the revival of essential raw or semi-processed material supplies from the Far East. It was a reasonable assumption a few years ago that when the disruption caused by Japanese invasions of the several supplying areas had been remedied the familiar shipments would return on something like the old terms. How far from the truth that was is seen now in terms of critical shortages of such essentials as oils and oil seeds and tin and extremely inflated costs of what comes to hand. All are familiar enough with the effects but few have the special facilities and the experience of detail, as well as of the larger picture, out of which Sir Geoffrey Heyworth, chairman of Lever Brothers and Unilever, Ltd., has built up from the industrialist's viewpoint a very revealing account of what is taking place. This is one of the principal contributions to the revived "Progress," the excellently produced magazine which the companies first issued in 1899 and suspended during the war. The greatest post-war problem, in Sir Geoffrey Heyworth's estimation, is an extension in a most acute form of the troubles which have hamstrung so much enterprise in the West, the exploitation of the workers for political ends, heightened by the facts that in Asia and S.E. Asia the pawns are more easily swayed than any in the world, are deeply suspicious—not, it must be admitted, entirely without cause—and are nearly all infected with the same ferment of nationalism, with little or no realisation of what is involved. For them the results in India, Burma and

Indonesia seem so far to have been almost uniformly disastrous, but that has not reversed the tide or enabled the traditional shipments to be resumed. Since many of those things are indispensable, it is not practicable to take the disinterested view of what is going on in these storehouses of the world, including the withdrawal or misdirection of labour. The Lever and Unilever chairman is in no doubt of our responsibility to provide more and better management and technical direction, and to inject in effect the leavening of European enterprise so conspicuously lacking in most Eastern affairs. "And," he says, "the people who take these jobs will have to look to make their careers in these countries." Many more are needed and those who go will have to stay to identify themselves with those lands and their people. The merchant venturer of to-day and to-morrow will have more exacting responsibilities than any who went before. The rewards will need to be commensurate.

Radioactive Elements

Studies by Soviet Scientists

SOVIET chemists are stated to be conducting exhaustive studies of the distribution of chemical elements in the earth's crust, with special emphasis on the rare and radioactive elements. This information was contained in the report made by Dr. R. Sonya G. Machelson, of the American Cyanamid Company, Stamford, Conn., to the national meeting of the American Chemical Society. Russian scientists, whose projects are sanctioned by the council of People's Commissars of the U.S.S.R., have also stressed physiological and chemical research on the effect of radioactive and rare elements on plant growth.

Much work, she said, had been devoted to the investigation of the occurrence of rare elements in fresh and salt waters, as well as to the radioactivity of waters, soils and organisms. This had led to the discovery of selective concentration of radioactive elements by plants from water solutions and soils. The amounts of radioactive radium, thorium, mesothorium and actinium contained in various sea and land organisms were described for the first time.

Dr. Machelson also reported that Soviet chemists have established the existence of so-called biogeochemical provinces, or regions possessing inadequate or excessive amounts of some chemical elements, causing changes in plant and animal physiology.

Radioactive Isotopes

Increasing World-Wide Use

MORE than 100 research institutions and hospitals in 15 foreign countries have received shipments of radioactive isotopes from the uranium chain-reacting pile at the U.S. Atomic Energy Commission's national laboratory at Oak Ridge, Tennessee. Recording the first anniversary of the initial shipment of the radio-isotopes abroad, the commission said that 21 nations have made formal arrangements to receive them.

The first consignment of radio-isotopes—radioactive phosphorus—was shipped to Australia. A total of 216 radio-isotope shipments were sent abroad during the first year of the commission's programme.

Twenty Elements Now

Isotopes of 20 different elements are now available from the American source. Overseas shipments have included radio-isotopes of 11 elements, radioactive phosphorus being chiefly sought. Extensive use is also made by radioactive iodine in medical treatment and the other isotopes are being used by foreign research groups for work in chemistry, physics, bio-chemistry, physiology and botany.

The report received by the commission from Australia shows that radio-phosphorus has already been used with good results in 11 hospitals for treatment of blood diseases. In addition many projects in other fields utilising other available radioactive elements are being planned.

The British report shows about 50 different biological and medical research projects under way in 21 institutions. Research work includes many problems of a fundamental scientific nature.

The report from Canada shows progress in studies particularly of a bio-chemical nature, utilising phosphorus, carbon and iodine.

New Blast Furnace for Mexico.—A blast furnace with a daily capacity of 200 tons is to be erected in the Mexican State of Sonora.

Rising Chemical Totals

New Plant in Poland

THE situation in the Polish chemical industry during the first quarter of the current year is reported from Poland to have been favourable both as regards the volume of production and the progress of development. Output of soda products, Glauber's salt, sulphuric acid, industrial gases and dyes was higher than in the last quarter of 1947, but there was a decline in the output of superphosphate, states a report sent to the Export Promotion Department of the Board of Trade by the First Secretary (Commercial) of the British Embassy, Warsaw.

In the first three months of this year, the manufacture of the following chemicals started: barium chloride, boric acid, tartaric acid, lead acetate, synthetic tanning extracts and technical gelatine. As a result of the amalgamation of a number of small establishments in the fatty manufacturing industries, the total number of chemical units fell from 147 at the end of 1947 to 144 at the end of March.

The second stage of the reconstruction of the State Nitric Compounds factory at Mosciec was completed and daily output of combined nitrogen was raised to 42 tons; installations for the condensation of chlorine (daily output capacity 1.5 tons) and for synthetic of methanol were also opened. The new carbide plant at Bobrek went into production; the present annual output is 15,000 tons).

Australia Rejects Nationalisation.—Mr. Chifley, the Commonwealth Prime Minister, addressing gatherings of miners in New South Wales coalfields, stated that the Government does not intend to nationalise undertakings other than public utilities which are not doing their best under private control and could serve better if they were not so controlled. He stated that there was no evidence that nationalisation of the mines would improve the position, and told the miners they must do their bit to help the Australian people to attain a decent standard of living.

U.S. PRODUCTION CONTINUES TO INCREASE

ASTEADY upward trend in production and sales in the chemical industries is shown by the reports of producers to the Bureau of Mines, United States Depart-

ment of the Interior. The following tables from the mineral market reports show comparison of figures over a period of three years:—

		1945	1946	1947
Boron minerals :	gross weight, short tons	325,935	430,689	501,935
Bromine and bromine compounds :	pounds	79,709,857	42,619,383	78,177,650
Calcium chloride :	short tons	218,320	262,147	271,206
Potash industry :	short tons	1,588,305	1,687,735	1,905,776
Sodium sulphates :	short tons	178,196	198,781	257,294
Sodium carbonates :	short tons	194,045	215,625	293,051

Dust in Industry

Society of Chemical Industry's Conference

A CONFERENCE on "Dust in Industry" is to be held by the Society of Chemical Industry, from September 28-30 inclusive, at the University of Leeds.

Among the many papers to be read are: "Dust Hazards in the Explosives Industry," by Prof. Cumming, R. Rumford and W. G. D. Wright; "Some Methods of Reducing Contact with Dusts in Chemical Manufacture," by L. Marsden, G. W. Roberts-on, and Dr. R. A. Storey; "Problem of Dust in the Chemical Industry," by G. L. Fairs and E. Godfrey; "Some Practical Methods of Industrial and Atmospheric Dust Elimination," by J. H. Hellyer and J. C. Cleave; "Precautions Against Explosion and Fire," by G. V. Thom and G. A. T. West; "The Lower Inflammable Limit of Explosive Dusts and the Influence of Diluents Thereon," by Dr. J. E. Garside; "Gas Explosions and Dust Explosions—A Comparison," by Dr. A. G. White, F.R.I.C., and E. Jones.

Physical Characteristics

In the session devoted to "Physical Characteristics and Estimation of Dust," the chairman is to be Prof. H. V. A. Briscoe, and there will be read, in addition to those mentioned above, papers by the following: G. Nonhebel, W. B. Laurie, and E. H. M. Badger. The group entitled "Practical Aspects of the Dust Problem," Part I, will be under the chairmanship of Julian M. Leonard, and a paper to be read, additional to those already quoted, is by: Dr. D. Hill. Mr. A. V. Hussey, O.B.E., is to be the chairman for the group of papers entitled "Practical Aspects of the Dust Problem." Part II, which are variously by L. Smith, R. Carnall and P. J. Rigden.

The "Fire and Explosive Hazards" session will be under the chairmanship of Lt.-Col. Sir Reginald Thomas, C.B.E., and besides those mentioned before, there will be papers by Prof. E. G. Cox and A. G. Peace, Dr. F. G. Tideswell, and Dr. D. Matheson. Under the general heading of "Health Hazards," with Prof. E. C. Doods, as chairman, there will be read papers by Prof. W. M. Cumming and I. A. Brownlee, Prof. E. J. King, Dr. T. A. Lloyd Davies, Dr. A. M. Currie, Prof. A. L. Roberts, LeDoyen Prof. R. Fabre, Dr. A. J. Amor, Dr. E. R. A. Merewether, C.B.E.

Summations of the work of the conference will be given, variously, by Prof. Briscoe, J. M. Leonard, A. V. Hussey, Lt.-Col. Sir R. Thomas, Prof. Doods, and S. Robson (chairman of council).

Specialised Photography

New Uses in Science and Industry

"PHOTOGRAPHY in Industry and Commerce" is the title of the revised Kodak Exhibition of Applied Photography which is to be shown in a number of provincial centres this autumn. New photographs and examples of photographic equipment have been added to the exhibition which was shown in London and in industrial centres last year. Among the many techniques to be illustrated, radiography, stress analysis, photo-template technique, data recording and motion study are of particular interest to the industrialist and business man. The scientist will find examples of black and white and colour photomicrography, spectrography, and nuclear track photographs used in atomic research. There are also examples of medical photography and an interesting series of photographs used by the police in the detection of forgery and fraud. A variety of new Kodak photographic apparatus will be demonstrated.

The exhibition will be on view at Newcastle, September 20-24; Liverpool, October 4-8; Nottingham, October 18-22; Cardiff, November 1-5, and Cambridge, November 15-19. Admission tickets are available from Industrial Sales Division, Kodak Ltd., Kingsway, London, W.C.2.

MINING AND METALLURGY

THE fourth Empire Mining and Metallurgical congress will be held in Great Britain from July 9 to 23, 1949. The congress, first held at Wembley in 1924, is organised by a number of British technical institutions connected with the mineral and metal industries.

The programme will be divided into three parts: (1) inaugural meeting and other official functions in London; (2) technical sessions in Oxford; (3) a number of excursions, based mainly on universities in Great Britain.

Ceramic Conference

The British Ceramic Society has co-operated with a group of ceramic industrialists and technicians in the Netherlands in organising the International Ceramic Congress now being held at Maastricht, Holland. Belgium, Denmark, France, Italy, Norway, Sweden and Switzerland are represented and the programme deals mainly with the pottery, artware refractories, and structural clay products branches of the industry. Visits are planned to a number of plants in Holland.

German Plant "Reprieved"

Chemical Dismantling Held Up

THE opposition by the U.S.A. to the dismantling of German plant which might possibly be of use under the Marshall Plan and the well-organised campaign which is being conducted both by German industrialists and trade unions, appears to have been partly successful, as far as the Rhineland-Palatinate is concerned. Out of a total dismantling list containing 83 units, 22 were scheduled for immediate removal. However, the Prime Minister of this Land has announced that 15 units have meanwhile been taken off this list. Plants reprieved include 12 former units of the I. G. Farbenindustrie and the Knoll A.G., the large-scale pharmaceutical manufacturing company of Ludwigshaven. The latter had already received orders from the French occupation authorities to commence the dismantling on September 15.

The revision of this list is partly being explained by the fact that, after the destruction caused at the Ludwigshaven I.G. works by the recent serious explosion, the dismantling would have meant a very severe reduction of the chemical and allied industries in the Land. There was also much opposition against dismantling the Knoll A.G., including opposition by U.S. interests, because lack of the products which this company makes would have increased the problems connected with the maintenance of public health. It appears, however, that no final decision has yet been made regarding dismantling there.

Dutch-German Agreement

Two-Way Trade in Chemicals

A RECENTLY signed trade agreement forms the basis for the resumption of trade between the Netherlands and the Bizone of Germany. Of chemicals, the Netherlands is to export, until the end of July, 1949, the following items: 1000 tons fatty acids, 1500 tons stearine and oleine, etc., 5500 tons of dextrine, 1000 tons of calcium carbide, 5000 tons of technical soap, 1000 tons of crude linseed oil, 1000 tons of sulphuric acid (66 per cent), 2000 hectolitres of industrial and pharmaceutical alcohol (96 per cent), lactic acid to the value of 106,000 florins, pharmaceuticals and alkaloids (1,126,250 florins), textile auxiliary products and sulphonated oils (265,000 florins), gland and hormone preparations (530,000 florins), and vitamins (53,000 tons). Various other chemicals to the value of 1,325,000 florins are also to be supplied to the Bizone.

The main items in the list of chemicals to be supplied by the Bizone to Holland are: salt 15,000 tons, butyl acetate 700 tons, tetrachlorcarbon 120 tons, magnesium sulphate 4000 tons, barytes 10,000 tons (including 150 tons blanc fixe), sodium sulphate (99 per cent) 2000 tons, pharmaceutical products intended for the Dutch overseas territories to the value of 530,000 florins, synthetic resins (331,250 florins), fine chemicals for laboratory purposes (159,000 florins) and various other chemicals to the value of 1,060,000 florins.

LETTER TO THE EDITOR

Wasting Manpower

SIR,—It was recently disclosed by the House of Commons Committee on Public Accounts that large numbers of workers were still being trained for the building industry when it was well known that building schemes had been cut. We should like to suggest that the time has come when it would pay the country more thoroughly to co-ordinate its training methods.

My own company recently opened a large factory at Newcastle for the production of Formica, which is a decorative laminated plastic with a large potential export demand. Staffing problems presented and still do present a major difficulty and we are ourselves having to undertake the complete training of all new employees. This has taken time and thereby lost us valuable foreign currency.

Under present conditions the flow of labour is closely controlled, and it should be comparatively simple also to forecast the relative needs of various industries and firms. Is it not possible to establish a planning board to co-ordinate, in respect of training, the needs of industry with the workers available? This could cover not only the immediate present, but could accurately judge the probable requirements of the labour market some time ahead. Such a board might result in considerable saving to industry and help in solving our economic problems. I feel sure that leading industrialists would be only too happy to co-operate with the Ministry of Labour in founding a plan along these lines.—Yours, etc.,

GRAHAME MARTIN-TURNER,
Director.

De La Rue Insulation, Ltd.,
London, W.1.

Continuous Fertiliser

U.S. Development of Urea-Formaldehyde

TO meet the need for a slow-acting nitrogen fertiliser desired for forage crops and pastures, specialists in the U.S.A. are developing a compound of urea and formaldehyde, "urea-form," of which the solubility in the soil can be controlled. Urea-form furnishes nitrogen to plants gradually and over long periods of time—an advantage not common to present commercial fertilisers.

In the form of a white powder, it has a capacity for taking up water from the atmosphere without caking or impairing its free-flowing qualities. When mixed with other fertilisers, it it stated to act as a "conditioner" by checking the caking of such a mixture. Free flow is especially important in fertilisers applied by modern machines which leave a band of fertiliser in the soil a little below and to the sides of the row where the seeds are planted. Tests have also shown that combination of urea-form with quick-acting nitrogen fertiliser furnishes a continuing nitrogen supply throughout the growing season, thus increasing total yield and spreading the plants' growth over a longer period.

A NEW FUNGICIDE ?

THE development of a new chemical which is stated to kill the fungi responsible for athlete's foot, ringworm of the scalp and plant losses estimated at more than two billion dollars a year, was recently reported by Dr. F. E. Cislak, director of research of the Reilly Tar and Chemical Corporation, Indianapolis, U.S.A. The synthetic product, called Echridine, is said in laboratory tests to have proved effective against fungi, even when diluted to a strength of one part in 150,000.

The doctor, in his address to the American Chemical Society, emphasised that the proof of its therapeutic value must await the outcome of clinical tests.

Echridine is a derivative of pyridine known technically as 4-(4-ethylcyclohexylmethyl) pyridine. The Reilly researchers, disregarding earlier attempts which had resulted in failure, found they could produce a strong fungicide by changes in the pyridine molecule and, knowing the molecular composition, they were able to synthesise Echridine.

Less than a century ago, the pyridine compounds, now recovered from the coke oven gases of steel mills, were burnt because there was no known use for them.

Paper from Straw

Allegations of Hold-up

ASUGGESTION that home-manufactured paper cannot be sold and is being held up at the factory was made at a meeting of the Lancashire Executive of the NFU, in Preston, recently. Mr. J. Heyes, Ormskirk, reported that paper makers were prepared to give a price for straw for paper making which would enable the merchant to pay the farmer £4 a ton. Unfortunately, that price was not always paid and the Cereals and Potato Committee were now pressing for farmers' trading societies to act as agents. Mr. J. R. Green, Atherton, said he understood that, owing to imports from Scandinavia, paper made from straw in this country was being held up; he knew of one factory that could not sell paper and would soon have to stop using straw, which they had been using to the extent of 300 tons a week.

Mr. W. E. Aspinall, Ormskirk, said the last information he had was that the price of pulp from other countries was almost prohibitive and manufacturers were seeking to develop the home market. Some manufacturers were interested in opening up more factory space for consuming straw. He undertook to press in London for trading societies to be appointed agents for the sale of straw for paper making.

EFFECTS OF ATOM BOMB

RADIOACTIVITY'S part in increasing crop yields of the atom-bombed Hiroshima and Nagasaki regions in Japan, is undoubtedly over-rated, according to Dr. C. L. W. Swanson, head of the Department of Soils, Connecticut Agricultural Experiment Station, New Haven, U.S.A., who was formerly a soils expert on the staff of General MacArthur.

Burned soil as a fertiliser is common in some parts of Japan, the doctor pointed out in his address to the American Chemical Society. Large amounts of ash, he said, were added to the soil by the bombings, and in many cases land formerly occupied by buildings was now cultivated.

Dr. Swanson explained that removal of trees by the explosions had increased sunlight; soil temperatures were raised with a favourable effect on plant growth. The bomb also partially sterilised the soil to a depth of four to six inches; this may have proved beneficial to plant growth in releasing nutrients contained in the bodies of soil micro-organisms.

U.K. Coal Research

Studies of Quantity and Quality

CHEMISTS in Chester are conducting a course of research which has a vital bearing upon the development of coal supplies from the north-west, including North Wales. This co-ordinated scientific approach to the problem of making the best use of our coal deposits represents the most encouraging feature of the nationalised coal industry.

In the Coal Survey Laboratories of the National Coal Board, North-Western Division, physical and chemical experiments of a delicate character are carried out, and are playing an important part in the National Coal Board's policy of reconstruction. Under this, many borings are being put down in the Lancashire and North Wales coalfields. The samples come into the office in complete cores, ranging in height from 1 ft. 6 in. to 6 ft. or more, and are ground to fine powder for the purpose of the experiments. By analysing these samples a complete picture of the quality of the seams can be obtained.

Augmented Supplies?

In both coalfields exploratory drifts for tapping new areas of coal are being driven at several collieries, and chemists are closely examining these seams as well in order to determine their qualities and the best uses to which they may be put.

Occupying a considerable portion of the time of the staff is the systematic investigation throughout the Lancashire coalfield of a well-known, but comparatively poor quality seam, of which there are fairly large reserves. Samples are being taken and analysed at every colliery at which it is exposed, the assembled data from which will give a comprehensive picture of the properties of the seam. It is hoped that this will be valuable in deciding whether exploitation would be justified, and whether it would be possible to obtain from it by selective working or cleaning an output of reasonably good quality.

Open-cast coal is also receiving attention, and seam samples taken in trial holes dug for the purpose of providing suitable sites are constantly being examined.

The same sort of work is being carried on also at the West Midlands laboratory.

Dr. J. O'N. Millot, Scientific Survey Officer to the North-Western Division of the National Coal Board, who is in charge of the Chester laboratory, has said that the North Wales coalfield, on a basis of estimates made by the Regional Valuation Board, contained reserves of coal of not less than 800 million tons, which should be adequate for at least 200 years.

Continental Shale Oil

More from W. Germany and Estonia

THE exploitation of important deposits of oil shale is reported to be a quickly expanding industry in Southern Württemberg, Western Germany. In July, 1947, the first of 24 distillation retorts of the large works at Frommern in the area of Balingen was started and a second works is situated at Dettershausen.

It is interesting to note that the last-named works is connected with a Portland cement plant which utilises the mineral matter remaining after the oil has been won. The production of a number of derivatives, notably of diesel oil, fuel oil, paraffin, fatty acids, etc., in conjunction with the production of building materials, renders this enterprise very economical.

In addition, a starting material for the pharmaceutical and cosmetic industries is being manufactured under the name of Balingol. Last year, some 4400 tons of crude oil were produced in this area as well as over 41,000 tons of cement and more than 26,000 tons of lime.

It is now being recalled that experiments were carried out over several years to distil Luxembourg oil shales in works in the Rhineland. It appears that this work is now in a fairly advanced stage, but it still remains to be seen whether effective production can be secured.

Soviet Developments in Estonia

According to a report published in the old-established Swiss daily *St. Galler Tagblatt*, the Soviet Russian authorities are paying great attention to the exploitation of the important oil shale deposits which occur in the former republic of Estonia, incorporated into the Soviet Union after the war.

These deposits have already been much fought over ever since methods for their exploitation became known. Nazi Germany coveted them chiefly because they yield a very pure fuel oil of special value for the propulsion of submarines and other vessels.

However, it appears that the importance of these deposits has been enhanced considerably by the fact that they are said to contain 200 grs. of uranium per ton.

The Sillemäe deposits, which belonged to a Swedish group, and were then occupied by the Germans, who destroyed the surface installations and mines in the course of their retreat, have been reconstructed by the Russian authorities who are said to be using large groups of forced labour. There appears, however, to be a shortage of technicians and appeals have been made to those specialists who have fled to Sweden or to Germany to return to Estonia.

Steel Supplies for Industry

"Full Allocations Received for Production"

THE £11 million development schemes which have been approved for the Scottish steel industry represent approximately one-third of the programme which is at present envisaged, according to Mr. George R. Strauss, Minister of Supply, when he spoke at a Press conference in Glasgow on September 10 during a short tour of factories and works in Central Scotland. Mr. Strauss added that many of the schemes which he had mentioned as approved earlier in the week were already at an advanced stage of development.

He indicated that the work which had been so far approved would not have any effect on the final decision, which was still to be taken, as to the ultimate location of the steel industry in Scotland. The alternative schemes of development in the Clyde estuary and in inland estates were still under active consideration. He hoped there would be a final recommendation on this matter well before the end of the year.

Limited Objective

Mr. J. C. Carr, a permanent official of the iron and steel division of the Ministry of Supply, commenting on the development programme at present approved, said it would have the effect of slightly increasing the present Scottish production. He indicated, however, that there was a limit to the worthwhile expansion in an area where most of the steel produced came from imported ore and imported scrap.

At this stage, at any rate, it had not been thought desirable to put the production target at too high a figure. A balance had to be kept within the schemes in England. The present output target of 2.2 million tons was regarded as a realistic proportion for present conditions.

Mr. Strauss revealed that difficulties in scrap supplies were now largely matters of purchase rather than transport so far as Germany was concerned, but he expressed himself as optimistic that the supply would be maintained and even improved in the future. That was what his department was aiming at, he said.

"We have already been getting substantial amounts from Germany, but in the future we want even more."

The Minister said he was satisfied that most industries were now receiving their full allocation of steel for production purposes. There might have been instances of supply falling short of allocation for short periods, due to holidays and similar causes, but

generally he denied that any industry was receiving less than its allocation.

What extra steel was available, he said, was, broadly speaking, going into capital improvements, as far as possible, rather than into channels where it would be used for manufacturing industries. Some of the extra steel production was of necessity earmarked for dollar-earning, in order to provide raw materials, but as far as could be done it was being shared out for capital improvements over a wide field of industry.

Mr. Strauss said that what he had seen in Scotland during the past three days satisfied him that the industries were in exceedingly good heart.

STEEL DEFENCE CAMPAIGN

A CAMPAIGN to preserve the steel industry from public ownership has been opened by Mr. Alfred Edwards, M.P. for Middlesbrough East, and is reported to have met with a strong support. The Steel Defence Campaign has a committee of six and an office in Queen Anne's Gate, Westminster.

A nation-wide scheme has been planned, embracing mass meetings, the issue of books and pamphlets, a film and advertisements to show what steel means to the country.

Mr. Edwards declared that the Cabinet had no heart in the decision to nationalise the iron and steel industry, and the issue might bring down the Government.

ANOTHER RECORD BROKEN

STEEL production for August reached the highest figure ever recorded for that month at an annual rate of 14,117,000 tons. An encouraging increase, the first for some time, was shown in the pig-iron production which was at the rate of 9.048 million tons in August compared with 8.908 millions tons in July.

The first part of the month was affected by holidays, but in the second part production was back to the pre-holiday rate of 15 million tons. Details of production, compared with last year, were as follows:

STEEL INGOTS AND CASTINGS
(in 000 tons)

	1948		1947	
	Weekly Average	Annual Rate	Weekly Average	Annual Rate
First quarter ...	287	14,933	210	11,232
Second quarter ...	294	15,323	244	12,694
August ...	271	14,117	234	12,179

SCIENCE IN WORLD AFFAIRS

BA President Defines the Widening Rôle of Technology



This year's president of the British Association, Sir Henry Tizard (left) whose presidential address is summarised here; and (right) his successor, Sir John Russell, the authority on soil chemistry, whose appointment to be the 1949 president was made by the general committee at Brighton



NONE of the many far-ranging pipers presented during last week and this at the annual meetings in Brighton of the British Association for the Advancement of Science covered more comprehensively the field of the inter-relation of science and industry than the presidential address by Sir Henry Tizard, K.C.B., F.R.S.* This, entitled "The Passing World," surveyed critically and realistically the development of science, and especially the varying degrees of technical application in industry, in the past 63 years and the results in human affairs.

The president prefaced his remarks with a review of the great scientific and technical achievements which were presented by workers of this country in the latter half of the 19th century—and received in many cases almost with indifference.

In 1885, he continued, after a few years of depression, during which nearly 700,000 men and women left the country to seek better opportunities overseas, the United Kingdom was still the greatest manufacturing nation of the world. An enthusiastic commentator wrote at the time that "the material greatness of the country is amazing—it exceeds that of any other Empire, Ancient or Modern. But the moral greatness is even grander. . . ."

The United States were not then serious competitors; imports of iron and steel manufactures from the United States reached only an annual value of £500,000 in 1890, but from then on steadily increased. Germany was considered a more serious competitor. In the

pursuit of science she stood first among the nations, and she was applying the methods and results of scientific research to industry on a scale and with a determination that far surpassed her rivals.

Germany kept her pre-eminence in applied science until 1914; but it is perhaps worth noting that she never equalled the industrial prosperity of England, judged by the test of real national income. She might have done so, had not her rulers believed that by war they could find a short cut to the happiness and wealth that could have come in the natural course of events to a hard-working and highly educated people anxious to live in peace with the world. The terrible fate of Germany is a tragedy that affects us all, the last act of which perhaps we have not yet witnessed.

Many of the numerous comforts and luxuries which are now within the reach of every diligent working man in England are the result of invention or scientific discovery in or about the year 1885. In the field of applied chemistry one far-reaching development to recall is the electrolytic production of aluminium in 1885. Aluminium was then a rare metal costing £18 a pound. It now costs 10d. a pound.

Thus, although the science of physics was languishing until the discovery of the electron, X-rays and radioactivity in the closing years of the century, it was a time of enterprise and progress in engineering practice. Britain prospered. In 1897, the year of the spectacular triumph of the *Turbinia* at Spithead, we exported goods to the value of one quarter of everything we produced.

* "The Passing World" by Sir Henry Tizard, was briefly summarised in the leading article, *THE CHEMICAL AGE*, September 11.

Ten years later we shipped overseas nearly one third of the whole national output of goods of all sorts—on farms, in mines, or in factories. If we were doing so to-day we should have little cause for anxiety.

Perhaps it was this very prosperity that caused us to fall behind in some branches of industry, for when there is little unemployment and when the standard of living is obviously rising in all sections of the community, there is an excusable tendency for manufacturers to go on doing what they know they can do successfully, rather than to launch out in new directions. Is not this, rather than the neglect of science, the chief reason for the fact that synthetic dyes and fine chemicals were manufactured in Germany, rather than in their original home England?

No Dearth of Ability

Whatever the answer to this question, the fact remains that when war started in 1914 we were caught off our balance. We found ourselves dependent on our enemies for many essential products and instruments on which our power to make war, and to maintain health, depended.

But, to everyone's surprise, we also found that the reserve of scientific ability in the country, though not large, was high enough in quality to overcome the immediate dangers with remarkable speed. Young men from the universities who had spent their time on researches of no practical importance applied themselves with success to problems often completely outside the range of their previous studies. We had the same experience in the Second World War, although fortunately we also had the foresight to prepare for some of the worst dangers beforehand.

There is a clear lesson, I feel, to be drawn from this experience. Whatever may be done, in a burst of public enthusiasm, to support and promote schools of research at universities, nothing should be allowed to lower the quality; and size, beyond a certain point, undeniably does. A research laboratory, of whatever nature, is like a living cell. Once it reaches a certain size, which may differ with the nature of the subject, it must divide or die.

The shock caused by the exposure in 1914 of our industrial shortcomings, which had been concealed by the apparent prosperity of previous years, led to a great increase of research by industry and by Government.

University schools of science were greatly enlarged, and under the influence of the great men of the inter-war period there was a surge of discovery which put Great Britain in the van of progress in nearly all branches of science. We became a scientific nation. The newer industries, such as the viscose and

radio industries, which had been founded on science, rapidly developed. The chemical industries took on a new and active lease of life. Germany, badly disorganised by defeat, ceased for many years to be a serious competitor in the world market.

Many of us have felt confident that when leadership in scientific and industrial research was allied to experience in commerce and manufacture, and to skill in craftsmanship, our country would have little difficulty in maintaining its position among the nations of the world. We have been disappointed.

I am referring now not to the acute difficulties of the present day, but to the general trend of events before and after the First World War, when in spite of a nearly continuous advance in national income and standard of living, Great Britain gradually lost her pre-eminent position.

We cannot attribute this relative decline to the 1914 war. That war had curiously little effect on our economy. Nor can we attribute it to the world depression in the 1930's. The depression affected us much less than many other nations, for owing to the great fall of prices of food and raw material the terms of trade moved sharply in our favour. During 1930-38 the volume of exports necessary to purchase a given volume of imports was only two thirds of what it had been during 1885-1914.

Objectives

To what then shall we attribute the relative decline? Shall we argue that a main cause was that research was on too small a scale, or shall we seek for other reasons?

Let us first be clear about what results we expect to come from the application of science to industry. The primary object of industrial research is severely practical. It is not to enlarge the boundaries of knowledge, or to publish scientific papers, although that may be a prerequisite or a consequence.

The object is to do something that has never been done before, or to do things better than they have been done before. And it has, or should have, the special object of reducing the labour required to supply the material needs and wants of men. All social progress such as spread of education, promotion of health, opportunities for leisure and healthy recreation, must depend on the power of science and technology to increase the productivity of industry.

The rate of social reform is set by the rate at which productivity increases; and social unrest is inevitable if reform lags too far behind the advance of technology, or is pressed too thoughtlessly before it.

In Britain, the productivity of labour is of primary importance, for unless it is as high as, or higher than, in other manufacturing countries, we shall not be able to compete in

the markets of the world. And the productivity of labour in Britain is far lower than it could be if the results of past research were more resolutely and continuously applied.

We find this particularly in certain industries of great importance. In the coal industry the results are painfully obvious—the coal raised per man employed is now lower than it was thirty years ago, when nearly all coal was hewed by hand.

Taking British industry as a whole, productivity is far lower than in the United States. In both countries about 40 per cent of the population is gainfully employed. In the United Kingdom the proportion engaged in manufacturing, building and civil engineering, which covers the production of all capital and consumer goods (other than minerals or food) is now a little less than 18 per cent of the population. In the United States the corresponding figure is 12 per cent; and yet in proportion to the population the volume of production is far higher than in the United Kingdom.

The causes of the relative productivity and wealth of nations are, of course, many and complex. We no longer have any outstanding natural advantages, and we must expect that given approximately equal skill in technology other nations with greater natural advantages will surpass us.

Resources or Ability?

Only by maintaining leadership in the application of science can we hope to keep our position among the great nations. So it is not surprising that the United States, and Canada, for example, with their great natural resources, and abundant supply of cheap power, should have passed us in wealth and productivity before the war. It would have been surprising if they had not.

But it is by no means so easy to explain why Switzerland, which in 1885 possessed a national income per head about two-thirds of that of the United Kingdom, should have equalled us in prosperity by 1939; or why the industrial productivity of Sweden, a country that has no coal, should have been rising so much more rapidly than ours in the years between the wars.

These two countries cannot be said to possess natural resources superior to ours; nor can it be argued that in the quality or quantity of scientific and industrial research they excel us. But I suggest that they, in common with the United States, possess a higher average standard of technology than we do, and have a much greater proportion of men of high scientific education in executive control of industry.

I quote them in support of my view that it is not the general expansion of research in Britain that is of first importance for the

restoration of its individual health, and certainly not the expansion of Government research remote from the everyday problems of industry. What is of first importance is to apply what is already known.

The fact is that all really new developments of industry are the product of the work of very few men. In general, knowledge in the physical sciences now accumulates at a rate much faster than it is, or possibly than it can be, applied in industry.

Knowledge Not Applied

There is a vast amount of knowledge waiting to be used. No new discovery, in any field, is likely to have so quick and beneficial an effect on British industry as the application of what is already known. We hear, for example, of the possibility of the production of power from atomic sources of energy. I do not think that anyone will be rash enough to prophesy what discoveries of real industrial importance will result from the researches now in progress; but I shall certainly assert that the production of power from uranium cannot bring such economic benefits to Britain within twenty years as would the practical application of known methods of economising coal.

Although I have been interested in the problems of industry for many years, I have never been closely concerned with its conduct. But for much of my working life I have been intimately concerned with that peculiar business called war, which is as old as agriculture, which is subject to the most violent booms and slumps, the cause of which we do not understand, and in which the incentive to succeed is greater than any profit or ideological incentive in civilian life.

We shall all hope that this business is moribund, and shall do our best to kill it: but in the meanwhile it is possible that other old industries have much to learn by studying the principles of its successful conduct.

In the first place, let us note that the managing directors, the chiefs of staff and commanders, are all carefully selected highly trained professional men, who have gained their experience in a hard school, and who, at intervals in their career, have had the opportunity to study, at staff colleges and elsewhere, the fundamentals of their trade.

The technical efficiency of the business is entrusted to a body of engineers and technologists, who have had an advanced specialised education and experience, and who are in personal contact at all levels with scientists who are concerned with research and development. This secures that in all research, however recondite, there is a practical objective, and that there is also a continuous urge to improve detail. There is no part in the whole process from research

to production and use that is neglected, and none in which scientific thought and influence are wholly absent.

It does not need any profound research to show that the British industries that are now best standing up to the strain of adverse circumstances are those that most nearly approach the system I have described.

The chemical industries, for example, have gradually developed a similar organisation over the last thirty years. Neither research nor development has been neglected, and management is in the hands of men highly educated in pure and applied science. The result is that our chemical industries are a source of great and growing strength in peace and war. Forty years ago they were far inferior to the German industries; now they have little to fear from any competitors.

In the steel industry, the efforts of which now merit our admiration, it is not uncommon to find management and direction entrusted to men of the highest reputation in science and technology.

Turn your eyes on any industry in the world that is similarly organised, on the steel industry of Australia, for example, or the photographic industry of the United States, or the machine-tool industry of Switzerland, and you will find that they are the best able to weather the storms and take advantage of the fair winds of trade.

Finally, all depends on good design and production. Our weakness in the war was not to be found in the judgment of what was best to do, nor in the scientific work necessary to do it. It was when the stage of design and production was reached that we fell short of the best standards.

Enthusiasm for Research

The magnetron, which contributed more to the success of the Allies than any other single invention, was a product of British science; but it had to be redesigned in the United States for economical manufacture. Penicillin, the greatest practical achievement of medical research during the war, also originated in Britain, but unless American skill in large-scale manufacture had been available, many thousands of men, who now enjoy a healthy life, would have died.

We now see history repeating itself. After the Second World War, as after the first, there is a cry for more research, in industry, and by Government, and a strong demand on the universities to expand their school of science.

Temporarily this enthusiasm is having an unfortunate effect, for the schools are getting starved of teachers; and unless a high standard of teaching is maintained in our schools, the next generation of scientists will suffer. In the long run, too, the expansion of research will fail to produce the hoped-for

result unless we promote at the same time education in the higher branches of technology, and unless the technologist takes his rightful place in industry.

Pure invention still has its place; but industrial prosperity will depend more and more on the continuous application of science to industrial practice. Unless we can raise our standard of technology, unless there are many more men in executive positions in industry whose practical experience has been preceded by a scientific education, we shall inevitably fail to keep our place among the great manufacturing nations.

[Sir Henry Tizard concluded his survey with an extended study of the profound population changes brought about by medical science in the past 60 years by preventing the attrition of disease, war and malnutrition. Those circumstances had helped to bring about a situation of grave danger of world-wide famine. No simple solution arising from the unaided action of scientists could be looked for. Escape from possible disaster, in his view, would depend, in this country, upon the greatest possible improvement and expansion of husbandry, with close attention to the scientific prevention of diseases of animals and plants, and the development of our colonial territories, especially the underpopulated tracts of Africa.]

German Analytical Practice

Microchemistry Progress

ACCORDING to BIOS Final Report No. 1606, the Kaiser Wilhelm Institute of Heidelberg used the Schuetze-Zimmerman method for the determination of oxygen. Compounds were decomposed in an atmosphere of nitrogen and the resultant gases passed over heated charcoal, converting the oxygen to carbon monoxide. This was then passed through a heated copper tube and thence into iodine pentoxide heated in an acetic acid bath. The liberated carbon dioxide could then be estimated gravimetrically or the liberated iodine titrated in the usual way. I. G. Leverkusen estimated oxygen at room temperature by activating the iodine pentoxide with concentrated sulphuric acid and pumice.

For the determination of acetyl groups, Heidelberg University chemists treated compounds with *p*-toluene sulphonic acid in the presence of ethanol, thus converting the acetyl groups to ethyl acetate. The latter is saponified with sodium hydroxide solution and the alkali used determined by back titration.

The preparation of pure ammonia and pure hydrochloric acid also receive mention in this report.

CONSERVATION OF VITAL MATERIALS

Scientists' Concern With Full Use and Recovery

THE economic aspects of the application of science formed the principal or subsidiary subjects of several of the papers presented to the British Association at Brighton. Surveys and discussions underlined the increasing awareness of the continued waste of essential elements, often due to unsuitable and unimaginative applications. Several contributors dealt very realistically, with the world shortage of foodstuffs, showing that while the condition was in no sense new it was potentially a greater menace than before and the most stringent measures, scientific, social and economic, would be needed to avert the worst consequences.

Emphasis was given in this, and in the studies of problems in other fields, that no solution could be looked for arising from the advance of scientific knowledge alone.

The theme of conservation of other vital materials was expanded in a very practical survey by Prof. J. D. Bernal, introducing a discussion of the conservation of chemical elements. The rapid increase in the use of materials by industry and agriculture threatened to exhaust the most concentrated deposits in a matter of decades. For countries with relatively limited resources like Britain, the problem was the more acute, he said.

Mining and Smelting Wastes

There was a cycle of industry, in which the elements were collected, dispersed, and again concentrated. The object must be to eliminate waste at every stage. In mining there was a more or less avoidable waste in material left in the ground or dumped as incapable of further extraction.

Mining and smelting processes had developed in a pre-scientific age, and while there had been improvements in detail there had not been enough fundamental examination of results in the light of modern technique.

It was at last coming to be recognised that no element should be used where its particular properties were not utilised to the full. In a few cases the peculiar properties of an element were necessary, but in most cases there was a fairly wide range of substitution. An adjustment to existing or foreseen shortages should be possible. By using more intelligence and less material, cycles could in many cases be kept continually expanding on the same amount of material.

Destruction and dissipation in chemical processes needed examination. The advis-

ability of locking up various elements for very long periods in structures should be examined. A general study of the principles of recovery was needed and its systematic application to all elements with due priorities. An example of improper use of material was the all-aluminium house.

World Resources

Emphasising that conservation was itself a complicated study, Dr. R. P. Linstead noted that more than half the research at the Chemical Research Laboratories at Pedington was on some aspect of that subject. More minerals had been taken out of the ground in the U.S.A. since 1900 than from the whole world in its previous history. There was a general world shortage of lead. It had been estimated that America, the world's largest producer, had, taken the pre-war rates of usage, eleven to twelve years' commercial reserves and five years' sub-marginal reserve.

New resources of lead were unlikely to be found and the mineral should be reserved for uses where its properties were essential.

There was no world shortage of sulphur, but its import was a drain on our dollar resources and there were sources of recovery in this country.

The comparatively high standard of economy attained in the iron and steel industry was revealed by Dr. W. M. Thring, who said that in the productive plants there was little waste of iron, apart from a 6 per cent loss in the slag, but large amounts of scrap were immobilised in the rest of industry. The large scale of the experiments needed made the investigation of alternative processes to smelting difficult.

Dispersed Sulphur

In a paper presented *in absentia*, Dr. R. Lessing stated that the amount of sulphur present in the coalmines in Britain annually was equal to 10 million tons of sulphuric acid, ten times our present production. Most of this sulphur escaped into the atmosphere to attack buildings, metal, clothes, and health. Methods for its extraction from chimney gases and the spent oxide of gasworks were known and used in isolated cases.

The increase of world food supplies would need increasing amounts of fertiliser, and the demand for sulphur would grow steadily and rapidly. Its dissipation must be prevented wherever possible.

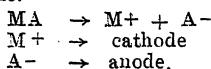
ELECTRODEPOSITION PRINCIPLES IN ANALYSIS

Classical Methods and Modern Trends

From a Special Correspondent

THE first electrodeposition experiments were carried out as early as 1850. In 1883, Killiani showed that there was a possibility of separating metals by using potential control. Then, round about 1900, Sand proved that rapid stirring was theoretically necessary for success in controlled potential methods. Thus, these methods, although they have not yet been very widely applied, have been known for many years.

When a metallic salt is dissolved in solution, it breaks up into cations and ions, and on passage of an electric current, the metallic ions pass to the cathode and are discharged, while the anions are discharged at the anode.



This elementary statement requires modification when conditions are further investigated. From the Nernst equation, it can be shown that when a metal is dipped into a solution,

$$E = E_0 + RT \log \frac{C}{nF}$$

where E = equilibrium potential difference between the metal and its solution,

E_0 = potential in a molar solution using the normal hydrogen electrode as an arbitrary zero,

n = the valency of the ion,

F = the Faraday constant,

C = the concentration (strictly the activity) of the ion,

the metal will not be discharged at the electrode until the potential of the electrode is made more negative than its equilibrium value, in other words, until the applied potential is greater than E . From this equation, it can be seen, among other things, that a definite voltage is required to produce deposition, and for every ten-fold increase in the concentration of the ion, the voltage must be raised by 0.058 volts.

TABLE I

$\text{Na} \rightarrow \text{Na}^+$	-2.8	$\text{Sn} \rightarrow \text{Sn}^{++}$	-0.19
$\text{Mg} \rightarrow \text{Mg}^{++}$	-1.55	$\text{Pb} \rightarrow \text{Pb}^{++}$	-0.12
$\text{Zn} \rightarrow \text{Zn}^{++}$	-0.76	$\text{Bi} \rightarrow \text{Bi}^{+++}$	+0.25
$\text{Cd} \rightarrow \text{Cd}^{++}$	-0.42	$\text{Cu} \rightarrow \text{Cu}^{++}$	+0.34
$\text{Ni} \rightarrow \text{Ni}^{++}$	-0.22	$\text{Ag} \rightarrow \text{Ag}^+$	+0.80

The potential for each metal is different. Normal electrode potentials for some of the commoner ions are shown in Table I.

When only one metal is contained in the solution, or when there is only one easily deposited metal, the process of determination is relatively simple. Platinum electrodes are normally used, unless there is some reason for avoiding this metal. The electrode on which the deposition takes place is usually made either of foil or of gauze, so as to present a large surface to the solution. Consequently only a very thin deposit of metal forms. Stirring may be carried out by means of a separate mechanical stirrer, or by using one of the electrodes, usually the anode, as a stirrer. Electrodes of this type are shown in Fig. 1 (below).

In the circuit shown in Fig. 2 (page 387), the applied potential is adjusted to a suitable value of anode-cathode potential. It is not necessary to know the precise cathode potential. Usually, however, the applied potential chosen is very little above that just required to cause deposition.

Deposition is maintained until all the metallic ion has been deposited. For any

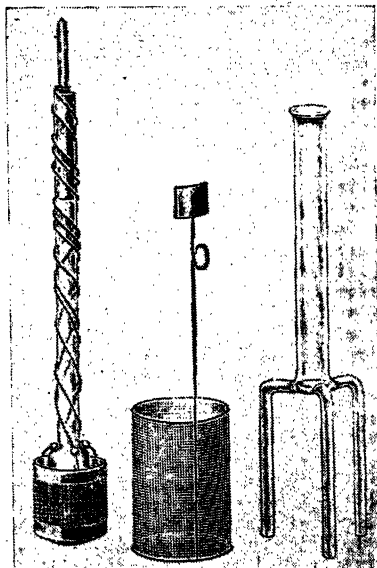


Fig. 1.

(By courtesy of Griffin & Tatlock, Ltd.)

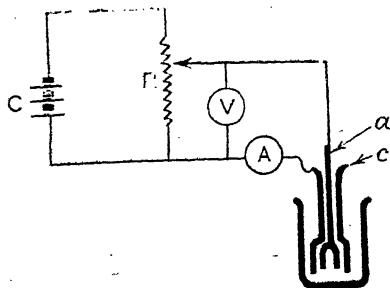


Fig. 2.

determination, the conditions of temperature and other variables have been chosen so as to give a fine deposit, which will adhere firmly to the cathode, for obviously a crystalline deposit which would drop off the cathode would be useless for the purpose in view. The deposit is then dried carefully. A very finely divided metal will be liable to oxidise.

If the determination is to be carried out on a metallic sample, this will first have to be got into solution. Some points must be borne in mind about the various acids which may be used for this purpose. Thus, while hydrochloric acid is generally useful as a solvent, chlorine will normally be liberated at the anode when current is

passed. This will of course attack platinum electrodes, and therefore evolution of chlorine must be avoided.

This can be achieved by the addition of an anodic depolariser, such as formaldehyde, hydroxylamine or hydrazine. These last two are normally used as the hydrochlorides. Again, hydrochloric acid or chlorides must not be present if silver is the metal being determined, since the metal must be completely in solution before the determination can be carried out.

Sulphuric acid is the most satisfactory acid when regarded from the point of view of electrodeposition requirements, but is not normally a very useful solvent. Nitric acid is a cathodic depolariser. It will thus prevent evolution of hydrogen at the cathode. This is usually desirable, and is particularly so when dealing with a metal which tends to produce a spongy deposit, since such tendency is increased if hydrogen is evolved.

Another instance when the presence of nitric acid is useful is when it is desired to deposit an oxide on the anode rather than a metal on the cathode. The presence of the nitric acid will help to prevent cathodic deposition.

Nowadays, stands carrying the electrodes and auxiliary apparatus are available commercially, and such a stand, set up for operation, is shown in Fig. 3.

Separations

If a solution contains two species of metallic ions, and if the cathode is maintained at a potential lying between the potentials characteristic of the two ions, only one of these should, theoretically, be discharged at the cathode. Consequently a separation of the ions should be possible, through control of the applied potential.

In actual practice there are numerous complications arising from such factors as concentration polarisation, overvoltage, and the necessity for having the conditions such that the physical nature of the deposit on the cathode is gravimetrically suitable. As a result, a satisfactory deposition of one metal, leaving the other completely in solution, is rarely achieved unless the normal potentials for the two ions differ by at least 0.3 volt.

For most purposes, it is found that the cations normally determined by electrodeposition are usually divisible, on this basis, into seven classes. In six of these, the metals deposit on the cathode, while in the seventh, the oxide deposits on the anode. Metals in different groups are relatively easy to separate, but within the groups separations by straightforward methods are not normally possible. In the first group are included gold, mercury, silver and the

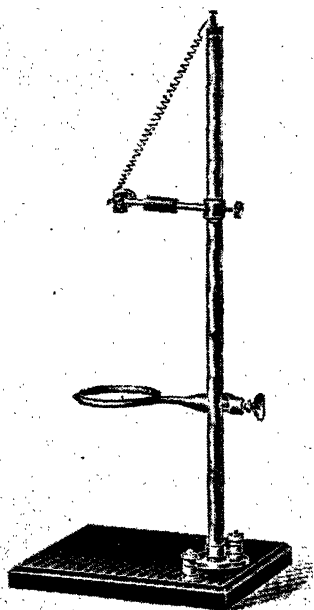


Fig. 3.

(By courtesy of Griffin & Tatlock Ltd.)

platinum metals. The second group comprises copper, antimony, bismuth and arsenic, and the third contains lead and tin.

All these metals may be deposited in acid solution without any very precise control of the pH. If the pH is carefully controlled, the fourth group, cadmium and zinc, can also be deposited from acid solution, but no hydrogen must be evolved at the cathode.

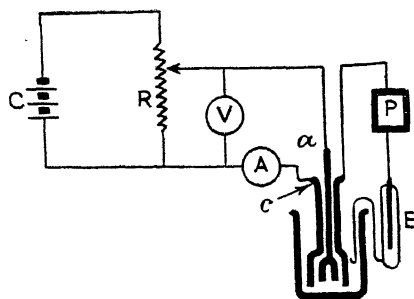


Fig. 4.

The metals in the fifth group, iron, cobalt and nickel, are normally deposited from alkaline solution, and this is generally more difficult than in the acid depositions.

The sixth group, and the last group to deposit as metals at the cathode, comprises the alkaline earth and alkali metals. Direct deposition methods are not employed for these elements. As a rule they are deposited at a mercury cathode. The amalgam is then decomposed, and the metal is determined by subsequent titration of the hydroxide.

For controlled potential separations (as will be seen from Fig. 4) the circuit is similar to that used for simple deposition, with the addition of an auxiliary electrode in a potentiometer circuit to measure the applied potential. The externally applied e.m.f. is increased until the potentiometer in the opposed, auxiliary electrode circuit gives the correct reading. Continual adjustment will be necessary throughout the course of the deposition, as the concentration of the ion being deposited gets lower.

The separation of silver and copper by such methods can be taken as a simple example. Because of the considerably more negative normal potential of silver, it starts to deposit long before a value of the applied current necessary to cause copper to deposit is reached. As the concentration of the silver ions falls, the applied e.m.f. must be gradually increased. However, considerable increase of the e.m.f. would cause the copper ions to deposit, and so the cur-

rent must be suitably adjusted so as to prevent this.

In order to achieve a quantitative separation of silver from copper, it will be found that in practice it is necessary to start with a solution which is not more than 0.1 N with respect to copper. If this condition is observed, the concentration of silver ions in the solution will have fallen to a negligible value before the copper ions start to deposit.

Alloy Deposition

In the controlled potential deposition which has just been considered, it has been assumed that the aim has been to achieve separation. Certain instances in gravimetric work require just the opposite, the co-deposition of two metals.

Silver, for example, tends to give a very coarsely crystalline deposit, and one which is not very suitable for gravimetric work. However, if silver and mercury are deposited together, then a good deposit can be obtained. As a consequence, it is the usual practice, when determining silver, to add to the solution a known amount of a standard solution of mercury. The total deposit obtained is weighed, and a correction is made for the amount of mercury known to have been added, difference giving the amount of silver.

Again, arsenic determinations are unsatisfactory, except in the presence of copper. As will be seen from reference to the groups, copper and arsenic occur in the same group, and will co-deposit. But in the presence of copper, the deposition of arsenic, which in simple solution is not complete, is quantitative. Thus, addition of a known amount of copper sulphate to an arsenic solution permits the arsenic to be deposited, completely, a subsequent correction being made for the amount of added copper.

It was mentioned earlier that metals in the seventh group were deposited, not on the cathode in elemental form, but on the anode as oxides. For example, lead, manganese and cobalt can readily be estimated in this fashion.

It will have been noted that metallic lead can be deposited on the cathode (third group), but the usual practice is to deposit it on the anode. This permits of its determination simultaneously with a metal such as copper, the copper appearing on the cathode; the terminals are then reversed, and lead is deposited as oxide.

There are two experimental errors in the determination of lead on the anode, for which corrections must be applied. The oxide is more or less hydrated, and it seems impossible to dry the deposit completely. In consequence, an empirical factor must

be applied for the added weight due to water.

On the other hand, complete deposition of the lead does not take place, and there is therefore a negative error, which arises from this cause. This latter error, which is opposed to the former, may also be corrected for empirically. However, some workers have corrected for the incomplete deposition of the lead by the use of a radioactive indicator, so that measurement of the radioactivity of the residual solution indicates the amount of lead not removed in the course of the deposition.

Electrographic Analysis

Strictly speaking, it would be more logical to consider electrographic analysis before gravimetric electrodeposition methods, since electrography is really the qualitative application of electrodeposition. However, it is mainly a more modern development, which depends on its effectiveness largely on the use of organic reagents, and therefore chronologically this is the correct place to deal with it.

Using an apparatus such as that shown in Fig. 5, passage of a current causes ions to flow from a metallic surface into a moist paper which has previously been impregnated with a reagent which will form an insoluble, and preferably a highly coloured compound with the metallic ions. As a consequence, the presence of any metal can readily be demonstrated, and, in addition, the existence of a uniform distribution of the metal, or of segregation, can readily be discerned.

Internal Electrolysis

A final method developed in recent years as an extension of electrodeposition methods in the classical sense must be mentioned. In this, no external source of current is used, the necessary current being supplied by the solution of a base-metal anode in the electrolyte.

The cathode is usually made of platinum gauze, and the catholyte and anolyte are usually separated by a parchment membrane. This method is particularly useful

when it is desired to determine small traces of a more noble metal in the presence of large amounts of a base metal.

Two examples will illustrate the use of this method. Where it is desired to estimate traces of copper in steel, an iron anode is dipped into ferrous sulphate solution, which is maintained in the ferrous state by the addition of a little hydrazine sulphate. This portion of the cell is contained in a

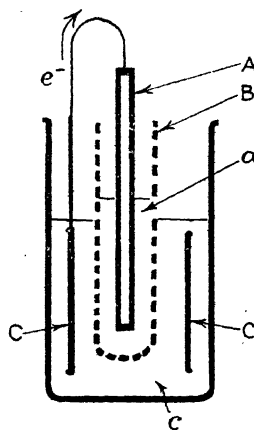
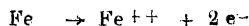
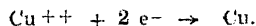


Fig. 6.

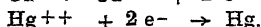
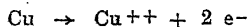
parchment bag, which is placed centrally in a platinum gauze cathode, inserted in the catholyte, a solution of the steel being examined (Fig. 6). The anode and cathode are connected externally by a wire. The anode, dipping in the anolyte, goes into solution as ferrous ions, liberating electrons:



These liberated electrons flow through the external conductor to the cathode, where they discharge the copper ions from the solution of the steel on to the platinum cathode:



Again, the procedure may be used for determination of traces of mercury in brass. The set-up is the same, but now the anode is of copper, while the anolyte is copper sulphate solution. Electrons liberated by the solution of the anode flow externally to the cathode, and cause the mercury to deposit:



Numerous extensions of the internal electrolysis method to industrial problems involving trace elements may be anticipated.

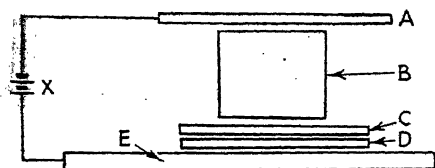


Fig. 5.

BRITISH EXHIBITION AT COPENHAGEN

Some Representative Chemicals and Scientific Instruments

ADDITIONAL to the information which has already been published in *THE CHEMICAL AGE* in recent weeks relating to the British Exhibition in Copenhagen—which opens to-day (September 18) and continues until October 3—we are now advised that a Trade Information Centre will be provided there and will be located on the first floor of Nimb Restaurant in the Tivoli Gardens. Operating under the joint auspices of the British Import Union, the British Export Trade Research Organisation, the Federation of British Industries, and the Danish Merchant Guilds Association, it will handle inquiries from exhibitors and visiting British exporters and manufacturers on general marketing conditions for British goods in Denmark, Sweden, Norway and Finland. The centre will be open on weekdays from 10 a.m. to 12 noon and 3 p.m. to 6 p.m., and 10 a.m. to 12.30 noon on Saturdays.

The following are particulars of some of the chemicals and scientific instruments exhibits which have come to hand at the time of going to press:—

Exhibits of Chemical Firms

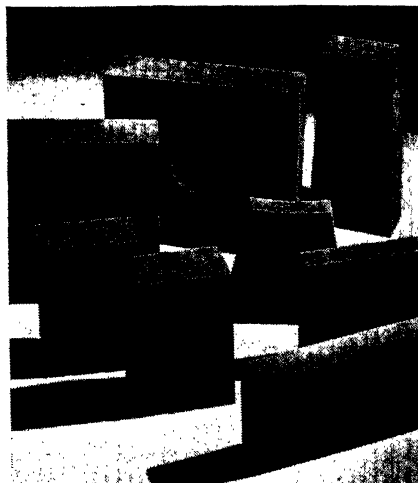
PETROCHEMICALS, LTD., is desirous of introducing to the Scandinavian countries the initial products of the Catarole process, and is therefore displaying at Copenhagen a range of over 60 chemicals. There will be included a simplified flow chart to illustrate the operation of the plant and a map showing the layout and location of the site. The firm believes that great possibilities for Scandinavian and European industries generally are opened by this new British chemical process which will, it is stated, constitute a great dollar saving for Great Britain. It is estimated that from four to six million dollars annually can be saved as a result of converting simple petroleum hydrocarbons into complex industrial chemicals at home rather than importing finished chemicals from dollar areas.

ALBRIGHT AND WILSON, LTD., chemical manufacturers, is taking part in the Copenhagen exhibition with their associated company, Thomas Tyrer & Co., Ltd. To make the most of this opportunity of forming personal contacts with Scandinavian and other friends, Mr. G. W. Startin, Albright & Wilson's export manager, hopes to be present throughout the run of the exhibition. Having lived and worked in Denmark and Sweden for many years, it is felt that Mr. Startin's intimate knowledge

of the people and languages will be of great value. He will be accompanied by Dr. B. V. de G. Walden, manager of the firm's European technical department, and visits will also be paid by Mr. J. C. Christopher, sales director, and Mr. Keith Piercy, development manager.

WILLIAMS (HOUNSLOW), LTD., are exhibiting examples in their general range of dyestuffs for all purposes and their harmless colours for foodstuffs. A particular feature of this firm's exhibit is the display for the first time of a range of new browns and blacks for the dyeing and staining of leather, which is expected to prove of especial interest to Scandinavians.

BAKELITE, LTD., display in the chemical section the three major groups of plastics produced by the company. These materials are grouped in three units—one devoted to Bakelite thermosetting materials, another to Waverite decorative laminates, and the third to Vybak plastics for the covering of electric cables and the production of extrusions of all types. In a section devoted to Bakelite resins and cements there is a photographic display showing the results of a ten-year test on a steel plate protected with Bakelite varnish. A single coating of this protective film has withstood ten years' immersion in moorland water of a highly corrosive nature.



"Carblox" tiles for use with chemical tanks

MONSANTO CHEMICALS, LTD., is showing a number of its principal products, each of which forms the centre of a display symbolising one important Danish industry, and representing the many others of the firm's products which are used in this particular industry. The industries concerned are those of rubber, pharmaceuticals, paint and plastics, timber, textiles, disinfectants, leather and food.

THE MORGAN CRUCIBLE CO., LTD., is showing, on Stand No. 72 (agent in Denmark Brodrene Dahl), crucibles, basins, stands, muffles, and covers, representative of the wide range of plumbago foundry equipment manufactured by them. Crucible melting is claimed to have many advantages: *e.g.*, it protects the metal from the flame and from gas pick-up, minimising the metal loss due to oxidation. Plumbago crucibles, in particular, do not contaminate the metal, which cannot stick to them, and by virtue of their high thermal conductivity they are economical of fuel. Salamander and salamander super crucibles are claimed to set a standard for quality which is recognised throughout the world, and are renowned for their consistently long life, high thermal conductivity and mechanical strength.

All Morgan crucible furnaces have the following features in common: They are designed to show the highest melting efficiency coupled with the strictest economy in fuel consumption, being rapid melters consistently with long crucible life. Every practical detail is considered to ensure easy and comfortable operation. They are economical of labour and floor space; and they are all very versatile in the metals and jobs they can handle. Of the various types

manufactured, three are being shown at Copenhagen, namely, lift-out, the bale-out, and central axis tilting.

On Stand No. 180 (Danish agent Otto Ahrens, Ltd.) the Morgan Crucible Co., Ltd., has a display of its "Morganite" all-carbon engineering parts. Impervious carbon is of interest in industries handling corrosive chemicals; it can be used to handle all but the strongly oxidising acids in a hot and concentrated state, and even hot sulphuric and hydrofluoric acids can be handled with perfect safety. Examples of "Morganite" impervious products are valves, stop-cocks, chemical fittings, and tubes for heat exchangers.

Chemical Resisting Bricks

Of special interest to the wood pulp and paper making industries are the Morgan Co.'s "Carblox" carbon chemical resisting bricks and tiles. They are used for the linings of wood digestors (sulphite process) and pressure storage tanks for sulphite liquors. In an inert atmosphere, carbon withstands temperatures of well over 2000°C. It does not melt, and the temperature has to be considerably higher than 3000°C. before it sublimates. It is therefore an ideal material for furnace tubes, boats, and moulds, for the sintering of tungsten carbide tool tips. "Morganite" carbon tube is used as a heating element directly heated by electric current to produce the high temperature required; and the boat or mould containing tungsten carbide to be sintered is placed inside the tube, the complete equipment being enclosed in an inert atmosphere, usually hydrogen. Then there are "Morganite" carbon piston rings, used by food manufacturers, mineral water manufacturers, brewers, and paper manufacturers, as an ideal means of producing the oil-free air, gas, or steam they require. Compressors fitted with "Morganite" carbon piston rings are claimed to deliver air, gas, or steam, perfectly free from oil, for with carbon piston rings and packing the need for lubrication is entirely eliminated. Moreover, the cylinder bore, instead of wearing, is found to acquire a mirror-like polish. Usually the piston is built up to accommodate the rings, which are stated to have a working life of about 15,000 hours.

Then there are "Morganite" carbon seals, which are employed to seal a wide range of fluids.

FOAMITE, LTD., Station Road, Langley, Bucks., is exhibiting a representative range of its fire-fighting appliances, especially its CO₂ portable units, which are widely used in chemical works and are probably the most versatile means of "blanketing" a blaze. An attractive booklet "Safeguard-



"Morganite" carbon cocks, tee piece and impervious tubes

ing Your Property" describes and illustrates these appliances.

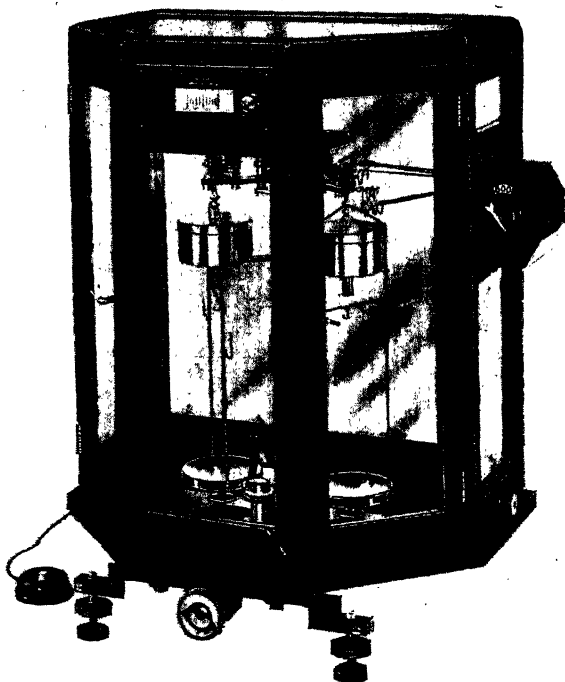
BAIRD AND TATLOCK (LONDON), LTD., is showing a representative range of scientific apparatus which it makes, laboratory equipment, pure chemicals and fine reagents. Its principal exhibits of equipment are the Warburg bath, electrolytic analysis apparatus, and its balances, notably the ZDC.259a of the aperiodic projection type.

The Warburg manometer is essentially an analytical tool, for kinetic measurements on the progress and rate of a reaction or system of reactions. The technique is flexible and adaptable to the study of a diversity of systems of varying complexity, and it would seem that any reaction involving the evolution or absorption of a gas could be conveniently studied by these methods. In addition, many reactions not directly involving gases may be investigated by indirect manometric measurement, one of the products being made to evolve or absorb a gas in a further independent reaction. A most important development is the use of the Warburg apparatus for quantitative micro determinations. Warburg manometers have also been utilised for direct gas analysis, and

as micronitrometers, but no kinetic measurements are involved.

The B.T.L. industrial electrolytic analysis apparatus is made in single test units as well as multi-test outfits. The single-test unit (illustrated on p. 393) for use with stationary electrodes, has high-speed independent stirring and a variable speed up to 5000 r.p.m. It can be supplied with or without hot plates. The multi-test outfits consist of two to five single-test units mounted side by side on a bench to form a "bank." The bench top is of $\frac{1}{2}$ -inch Solacite, which is acid resistant, while the lower part serves as a cabinet to house the independent rectifiers and transformers necessary for each unit. The transformers have a maximum consumption each of 100 to 120 watts, and the selenium type rectifiers give a D.C. output, of 7 amps. at 12 volts.

MUIRHEAD & CO., LTD., Beckenham, is showing among a great variety of highly developed measuring devices, its acoustic strain gauge. The principle on which this operates is basically the comparison of two audio frequencies, produced by the test and reference gauges. The frequency of the test gauge changes when stress is applied



Aperiodic balance by Baird & Tatlock, Ltd., with 3-weight rider attachment and a modified release system incorporating a slow movement until the beam is released, changing to a normal movement for releasing the pans. The change is made automatically by turning the one knob. The purpose of all aperiodic balances is to save time, and the B.T.L. models have an excellent performance in this respect. This is mainly due to the dead-beat action which saves the time taker in watching the oscillations of the pointer

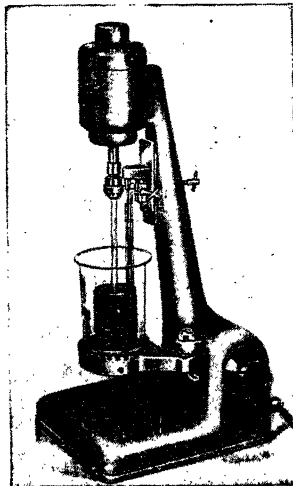
to the surface to which it is attached, and a calibrated adjustment on the reference gauge is used to match the two gauge frequencies before and after applying the stress. There is also on show a full range of models of the Weston standard cells which, because of the constancy of their e.m.f., are a recognised reference standard for potentiometric electrical measurements.

EVERETT, EDGCUMBE & CO., LTD., Colindale, Works, Hendon, London, N.W.9, is showing several new designs of portable scientific instruments, as well as working examples of process timers, operation graphers, and "Inkwell" graphic instruments. There is a hand tachometer with ranges 0/500 and 0/3000 r.p.m., and an auto-photometer for the accurate measurement of light intensity. One of the major new developments of this firm is the "Vampire" AC test set, in which are provided facilities for AC amps., volts and watts measurement without the use of any special connections, the various functions being selected by means of a switch. There is also a comprehensive test kit to cover DC measurement as well as AC. This latter includes a 500 volt DC insulation tester with conductivity range. All these exhibits are being shown on the stand of the firm's agents in Denmark, M. B. Cohn A/S.

Electrical Equipment

THE BRITISH THOMSON-HOUSTON CO., LTD., in collaboration with its several Danish agents, is exhibiting a comprehensive range of B.T.H. electrical equipment. This includes horizontal and vertical variable speed A.C. commutator motors, $\frac{1}{2}$ h.p. die-cast frame motors for horizontal and vertical mounting, various types of fractional horsepower motors, thrusters, suds pumps, electronic motor speed control units, electronic timers, photo-electric relays, and other electronic apparatus, including a magnetron as used in B.T.H. marine radar equipments. On view are photographs illustrating B.T.H. marine radar, and the latest developments in silicon and germanium crystal rectifiers.

METROPOLITAN-VICKERS ELECTRICAL CO., LTD., is exhibiting, in an extremely wide range of equipment, a model of a small rotary vacuum pump. This standard pump, many thousands of which have been manufactured, has been fitted with a glass and plate in order that the movement of the vanes and the circulation of the oil can be seen while the pump is in operation. Also shown is the Metrovac oil diffusion pump for use with high-vacuum apparatus. Then there is the EM3 electron microscope. This employs a three-lens image-forming system,



Industrial electrolytic analysis apparatus by Baird & Tatlock, Ltd.

which reduces the overall size of the microscope and increases the range of magnification that can be obtained. The movement of the mechanical stage allows the whole of the specimen to be scanned and also provides for stereoscopic work. The illuminating system employs a new design biased-grid electron gun which gives sufficient intensity to allow magnification up to 100,000 times to be used directly. The gun is supplied with high voltage up to 100 kV from an oil-immersed high-frequency DC set of new design. Stabilisation of the lens current and the high-tension supply is effected electronically, no supply batteries being required.

THE GENERAL ELECTRIC CO., LTD., of England, is exhibiting a wide range of products, and it is also interesting to note that the company has for some time had two interesting permanent exhibits in the city of Copenhagen in the Diopticon lanterns which light the streets and the many trolleybuses equipped with G.E.C. electric motors and control gear. The model being shown of a Sherwen vibrating screen is representative of the mining and materials handling plant manufactured by the company's Fraser & Chalmers Engineering Works. Various types of infra-red heating equipment can be seen on this stand as well as lamps of every description from the 5000 watt gasfilled projector for motion picture photography to the 32 watt exciter lamp for use with photocells for sound reproduction. Other lamp exhibits include 4 ft. and 5 ft. fluorescent



Portable pH meter by Marconi Instruments, Ltd.

tubes and a 125 watt black glass lamp of the type frequently used for detecting forgeries or the faking of works of art. Then, there are being exhibited on the G.E.C. stand many types of electronic measuring instruments, also a representative display of ventilating equipment manufactured by Woods of Colechester, an associate company of the G.E.C.; this latter exhibit includes aerofoil fans, man cooler and propeller fans.

MARCONI INSTRUMENTS, LTD., St. Albans, has included in its display at Copenhagen a number of instruments for industrial and laboratory use. Its Danish agents are Sophus Berendsen, A.S. Among the instruments being shown is the Video Oscillator, Type TF 885. This is an AC mains operated heterodyne oscillator covering the range 20 c/s. to 5 mc/s. in two bands and having a maximum direct output of 1 watt into 1000 ohms (31.6 V). Then there is its pH meter Type TF 717A, which is a sensitive electrometer of very high input resistance, arranged for AC mains operation and suitable for the measurement of small potentials developed by electro-chemical action.

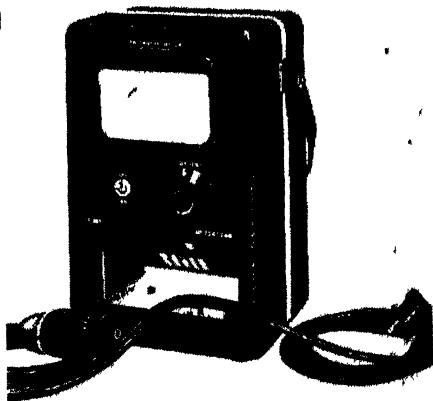
Also on show on the Marconi Instruments stand is its moisture meter Type TF 874, which determines the percentage moisture content of hygroscopic materials by a direct current method, relating moisture content to electrical conductivity. Another pH instrument is its recorder Type TF 880, which is entirely AC mains operated and is

for the determination of the pH of aqueous liquids, by electro-chemical means.

A thickness meter, TF 884, on the Marconi instrument stand is for use in determining the thickness of plating, paint, or other covering deposited on a ferrous base, without causing damage to the surface. The meter is AC mains operated and no valves are used, its functioning depending directly upon reluctance variation in a magnetic circuit. The test head, which is stowed within the instrument for transit, has a smooth spherical end in order that it may be used on other than plane surfaces. The moving coil indicating meter is calibrated in thickness over a total range of 0.001 in., with the first part of the scale divided to 0.0001 in.

THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD., Winder House, Douglas Street, London, S.W.1, is including in a wide range of electrical equipment and measuring instruments the Avo electronic tester. This is a 49-range measuring instrument of great versatility and high accuracy, designed to make most of the measurements encountered in the field of electronics. It consists basically of a highly stable DC valve millivoltmeter substantially independent of mains voltage fluctuations and valve characteristics, together with subsidiary circuit switching to give the 49 ranges.

QUICKFIT & QUARTZ, LTD., "Triplex" Works, King's Norton, Birmingham 30, has at Copenhagen exhibits covering its two main fields of production, namely laboratory apparatus incorporating interchangeable conical ground glass joints, and industrial plant in glass.



Thickness meter by Marconi Instruments, Ltd.

A New Glass Pump

Impervious to Most Acids and Alkalis

AN important development in pump design has been introduced by Tungstone Products, Ltd., with the demonstration of a new glass pump. Made of Pyrex borosilicate glass, it makes practicable the safe conveying of all acids and alkalis of pH—8 or less (concentrated hydrofluoric and glacial phosphoric acids excepted).

The use of glass is made possible by the absence in Tungstone pumping equipment of all centrifugal and reciprocating stresses. The pump has the additional advantages of visibility, cleanliness, and a capacity for withstanding temperatures up to 200 C. It can be flushed with steam, hot water, or hot acid solutions. With a capacity (4 ft. inlet head) of 300 gal. per hour, at up to 50 lb. per sq. in. delivery pressure, and requiring 1½ to 4½ cu. ft. of free air per min., the Tungstone pump weighs 54 lb., and measures 18 by 18 in. by 30 in. overall height.



Typifying the increasing use of glass in larger-scale equipment, this Tungstone pump employs highly impervious Pyrex material and involves little danger of shock of impact damage

Increased Fire Losses

Appeal to Volunteers

COMMENTING on the recently published £2 million increase in fire losses during the last six months (as compared with the corresponding period of 1947), Mr. W. H. Tuckey, O.B.E., director of the Fire Offices' Fire Protection Association, says that it is not possible at present to obtain a true picture of the situation because of the absence of comprehensive statistics. Moreover the reduced purchasing power of the pound sterling makes comparison with pre-war figures misleading; nevertheless this continued high rate of fire wastage is serious and disturbing.

It was with a view to attacking the problem from all angles that the F.P.A. was recently formed, and is co-operating with local authorities, industrial fire brigades, insurance companies and research organisations, and the Government, in its efforts to reduce losses.

Another factor which affected fire losses was the altered trend of volunteer spirit. While the industrial and private fire brigades were stronger than before, a number of public fire brigades which depend on volunteer or retained firemen (i.e., men who are paid a small retaining fee) were undermanned. This is particularly apparent in small towns and the country areas. Industry had during the war spread into many of those districts and the risks had increased correspondingly.

BIG CELLOPHANE EXPANSION

PLANs for a \$4 million addition to the company's Cellophane plant at Shawinigan Falls, Quebec, were announced last week by Canadian Industries, Ltd. When completed, the enlarged facilities will enable the plant to increase production by 200 per cent over its pre-war output, said the announcement. Work on the new project will begin immediately and is expected to be completed in 1951. It will entail both building extensions and installation of new machinery.

The plans announced are in addition to an earlier expansion and modernisation programme, launched at the end of the war, which will be finished next summer. According to the announcement, three-quarters of the Cellophane produced at Shawinigan Falls is used in the Canadian food industry.

The original "Cellophane" plant went into production in April, 1932. In addition to the Cellophane works, C.I.L. also operates at Shawinigan Falls plants producing caustic soda and chlorine, hydrogen peroxide and trichlorethylene. A new cellulose sponge plant is expected to be in operation next year.

Home News Items

Airmail to Europe.—Since July 1 all letters, letter packets and postcards for Europe, except Germany, Poland and Iceland, prepaid at the ordinary international rate of postage, have been forwarded by air whenever this offered earlier delivery. During the first complete week of this "all-up" scheme, the weight of mail despatched was 56,100 lb.

Factory Fire Averted.—Prompt action on the part of the works fire picket saved tanks of inflammable liquids, recently, at the Monsanto Chemical Works, South Docks, Sunderland, when he extinguished the blaze after some waste oil in a creosote tank caught fire from a spark from a nearby oxy-acetylene burner. When the fire brigade arrived the blaze was already out.

Overseas Economic Surveys.—Two further Overseas Economic Surveys, in the series published for the Export Promotion Department of the Board of Trade by H.M. Stationery Office, will be available shortly. The survey relating to Iran was published on Friday, price 1s. The publication date for the survey of the U.S.A. is Friday, September 24, price 3s. 6d.

Petrocarbon Work Continues.—Settlement has been reached of the strike which recently interrupted the constructional work on the site of the Petrocarbon plant at Carrington, Shropshire. The worker, whose dismissal was the subject of the dispute, was reinstated and union officials have given assurances that care will be taken to preserve discipline and smooth labour relations.

Chemical Employees in Czechoslovakia.—A steady increase in the number of persons employed in the chemical industry of Czechoslovakia is shown in the *Ministry of Labour Gazette* for August, 1948. Figures based on data from *Statistický Zpravodaj*, monthly journal of the National Statistical Office of the republic showing the following comparison:—1946: June 1, 65.5; December 1, 68.3; 1947: June 1, 75.9; December 1, 81.9.

The Film in Scientific Research.—The Science Committee of the Scientific Film Association has arranged a one-day conference, to be held on October 12, from 10.30 a.m. to 9.30 p.m., at the Royal Institution of Great Britain, 21 Albemarle Street, London, W.1, on "The Film in Scientific Research." At the morning session Prof. G. I. Finch (Imperial College of Science and Technology) and Prof. M. Florcken (University of Liège, Belgium) will speak from the chemistry angle. Further details are obtainable from the honorary secretary, Science Committee, Scientific Film Association, 34 Soho Square, London, W.1.

Cement from Germany.—Substantial quantities of cement and cement clinker from Germany are being imported by arrangement with the Cement Makers' Federation. These will augment supplies available for areas normally served by British cement, according to a Ministry of Works announcement. First shipments will go to Scottish ports, and are expected soon.

Coal Below Target Figure.—Despite a small increase last week of the output of the mines—to 3,815,100 tons—the total coal output of 4,026,600 tons again fell short of the level required to reach 211 million tons by the year's end. Opencast production fell to 211,500 tons. A weekly output of about 4,300,000 tons would now be required if the year's target is to be attained.

Under-Production in South Wales.—The Joint Industrial Council of the Welsh plate and sheet industry decided at its meeting in Swansea this week to form a committee to examine production problems in the mills. Captain Leighton Davies, who was elected the employers' chairman, had stated earlier that production, compared with 1939, had fallen by about 30 per cent and some 45 mills were idle because of labour shortage.

Steel Expansion Continues.—In spite of threats of nationalisation, the Deeside steel factory developments of John Summers and Sons, Ltd., are proceeding well. Foundations have now been laid for a new smelting shop and building of two new blast furnaces will, it is hoped, begin shortly. These improvements will increase output by 25 per cent, but it will be four or five years before they will mean increased employment.

New Cold Reduction Plant.—An official of the Steel Corporation of Wales has stated that within the next nine months or so work in connection with the installation of the cold reduction plant at Trostre, Llanelly, will reach a stage at which employment figures will rise to 2200, compared with the present 600. The company was considering the provision of a hostel or camp for the temporary accommodation of between 200 and 300 craftsmen.

Rubber Research and Organisation.—Problems dealing with the resilience of natural rubber methods of hardening, and means of packing in smaller bales, are contained in the rubber departments section of the Imperial Institute report for 1947. A pilot plant for the preparation of dry rubber by continuous process has been erected at the institute for experiment; when the work is completed and satisfactory, the plant will be dismantled and shipped to Malaya.

PERSONAL

MR. A. J. QUIG has been appointed a deputy chairman of Imperial Chemical Industries, Ltd. Mr. Quig, who is 56, was educated at Glasgow High School. He joined Nobel Explosives, Ltd., in 1907. During World War I he served in France and was wounded at the battle of the Somme, and later went out to India as adjutant of the 1st H.L.I. In 1926, shortly



Mr. A. J. Quig

before the formation of I.C.I., Mr. Quig was appointed manager of Nobel Chemical Finishes, Ltd. Ten years later he became chairman of the Paint & Lacquer Group—now I.C.I. Paints Division. He was elected to the main board of Imperial Chemical Industries in 1940, and appointed commercial director in 1944. The other deputy chairmen are SIR FREDERICK BAIN, SIR WILLIAM COATES, and MR. J. ROGERS.

MR. SAM C. WHITEHOUSE, assistant manager of the Kobuta, Pennsylvania, chemical plant; of Koppers Company Inc., has been appointed export manager of the chemical division's sales department. From October, 1945, to November, 1946, he was loaned to the Reconstruction Finance Corporation, being made styrene manager and assistant production manager for the entire programme of the Office of Rubber Reserve.

At the meeting of the Grand Council of the Federation of British Industries recently, **SIR ROBERT SINCLAIR, K.C.B., K.B.E.**, was appointed deputy president of the federation.

PROF. GUSTAVO COLONNETTI, president of the Italian National Research Council, has been in London for the past fortnight, under the auspices of the British Council. He came here to study the organisation of

scientific research, especially the methods by which the British Government is assisting and sponsoring research, and visited the National Physical and Chemical Research Laboratories at Teddington, the Department of Physics at Oxford and the Atomic Energy Research Station at Harwell. Prof. Colonnetti is, in effect, the head of the whole structure of scientific research in Italy. In 1920 he founded the Institute of Mechanics of the Turin Polytechnic and until 1939 was director of the Institute and Professor of Engineering in the University of Turin.

MR. WILLIS ROXBURGH, a director of Albion Light Metal Products, Ltd., Glasgow, has been unanimously adopted the Unionist Party's candidate in the Parliamentary by-election in the Gorbals Division of Glasgow. He is 35, was born in Ayrshire, and during the war served in the RAF as squadron leader.

Chemistry Training

Three New Courses at the Cass Institute

THE new session of the Sir John Cass Technical Institute begins this month with an interesting and comprehensive syllabus. In the department of chemistry, three courses are of special contemporary interest.

The first consists of a series of twelve lectures on spectroscopic analysis by S. Judd Lewis, D.Sc. (Lond. and Tübingen), F.R.I.C., and T. J. Bowen, M.A. (Oxon.), A.R.I.C., which will be held on Friday evenings. The fee for the course is £1.

Microchemical analysis by David W. Wilson, M.Sc. (Belfast), A.R.I.C., is the subject of the second course of ten lecture-demonstrations suitable for analysts and advanced students of chemistry. These will be given on Thursday evenings, the fee being £1 for the series.

The third course forms the first part of a two-year scheme of lectures on advanced organic chemistry to be given by A. G. Lidstone, M.A. (Cantab.), B.Sc. (Lond.); T. Henshall, M.A., D.Phil. (Oxon.), and D. H. R. Barton, B.Sc., Ph.D. (Lond.), A.R.C.S., D.I.C., to be held on Wednesday evenings, at a fee of £2. The outline for the present session will deal with: Alkaloids, carotenoids; anthocyanins and anthoxanthins; sterols, bile acids, sex hormones, etc.; vitamins; antibiotics; haemoglobin and chlorophyll; nucleic acids. Part II will be given during the 1949-50 session.

Repairs and rebuilding of the institute, damaged during an air raid in 1940, are in progress.

Chemical Trade Prospects in Pakistan

Britain Holds the Bulk of the Market

ACCORDING to recent reports on the chemical market in the new Dominion of Pakistan, prepared by the U.K. Trade Commissioner at Karachi and published by the Board of Trade, the small pre-war demand in the areas now forming the state is likely to increase considerably if and when the Government implements its programme of industrial and agricultural expansion. Part of this demand will probably be met by the erection of local works which will in the main process domestic raw materials. However, there is bound to be much scope for foreign manufacturers of chemicals, particularly of more complex compounds, the making of which is out of the question in Pakistan for a very long time to come.

In spite of import restrictions, the U.S.A. has captured the position formerly held in this market by Germany and Japan, and imports are also coming in from France, Belgium and Italy. However, the lion's share of the market still goes to British manufacturers, who now ship about the same volume as before the war.

Despite the fact that Pakistan is still a "sellers' market," complaints have been made that British chemicals are too highly priced and that their packing is very bad. However, if prices can be kept down and delivery terms observed, and packing improved, U.K. chemical manufacturers should be able to hold their own in the Pakistan market.

Pakistan is still largely an agricultural country. Its mineral resources, while believed to be extensive, have so far been

little exploited. In fact, only gypsum, salt and chrome ore are being won at present. There are deposits of inferior coal, and iron ore occurs in Baluchistan. There is a small and declining production of oil in the West Punjab at Attock, but it is hoped to discover further oil deposits as a result of geophysical survey work taking place at present. There is much scope for the development of hydro-electric power.

The industrialisation of this Dominion was considered at a conference held towards the end of last year in Karachi, the capital. A tentative building scheme includes, *inter alia*, the erection of three oil refining and hydrogenation plants, 15 tanneries, one match factory, two cement plants, 20 plants making glassware, two soap and glycerine factories, one plant for the production of drugs from medicinal herbs, and several chemical works.

Regarding the chemical production, the conference discussed plans for the erection of three caustic soda plants in the West Punjab, the N.W. Frontier Province and East Bengal, with a planned daily output of ten tons, two soda ash plants at Karachi and Khewra with an annual capacity of 40,000 and 10,000 tons respectively; four sulphuric acid units at Chittagong, Khewra, Karachi and the N.W.F.P., with an output of 10 tons a day. In addition, a plant for the manufacture of calcium carbide, cyanine and allied products is recommended to be established at Kalat. The scheme also contains provision for the establishment of fertiliser factories.

FERTILISERS IN ITALY

DURING the 1947-48 campaign, 866,000 tons of phosphate fertilisers were distributed in Italy. This compares very favourably with the 200,000 tons in the 1945-46 period, but is still 36.5 per cent short of the 1,300,000 tons used before the war. As regards other types of fertilisers, such as sulphate of ammonia, calcium cyanamide, nitrate of calcium, and sodium nitrate, their consumption reached 498,300 tons, or 20 per cent short of the 611,500 tons pre-war. The factor that has been particularly responsible for the slower post-war consumption of fertilisers in Italy, it is stated, is the discrepancy between the cost of the fertilisers and the price which farmers were able to command for their produce.

PYRETHRUM EXPERIMENTS

THE Kenya Board of Agriculture has recently been informed of the results of a series of experiments carried out over the last nine months with pyrethrum powder as an insecticide to protect stored grain. They show that pyrethrum retains its properties as an insecticide over a longer period than was previously believed if it is mixed in grain bags where it is not directly exposed to light and air. Very effective protection against weevils was given over a period of 8½ months by mixing 1 lb. of ordinary pyrethrum powder into each sack of grain. At the end of that time treated and untreated sacks of wheat were valued, the treated sack being assessed at nearly double the untreated sack, which had suffered from insect damage.

Overseas News Items

Pain Killer.—Discovery of a new pain killing drug many times more potent than cocaine, was claimed at the 114th national meeting of the American Chemical Society.

Economics of Atomic Energy.—The Teaching Institute of Economics of the American University, Washington, plans to concentrate all its facilities during the next 12 months to provide a comprehensive study of the economic aspects of atomic energy.

Award for Biggest Improvement.—Employees of the Montreal plant of Monsanto (Canada), Ltd., received a plaque and individual awards for plant improvements made during the past year. Monsanto have 17 plants, and the plaque is awarded annually to the one which shows the biggest improvement during the period.

Uranium Mine Disaster.—Twenty-four forced labourers are reported to have been killed in an accident in a uranium mine controlled by the Russians at Ane in the Soviet zone near the Czech frontier, according to a Berlin message. Water has flooded the mine, and eight other workers said to be missing have been given up for lost.

Oil Drilling in Central Africa.—A report in the Dutch economic daily *Economische Voorlichting*, says that drilling for oil is taking place in the neighbourhood of Lake Alberta where oil seepages were discovered some 20 years ago. The operations are said to be taking place on the territories of Uganda and the Belgian Congo and secrecy is being preserved regarding results.

Declining Belgian Coal Production.—Belgium's coal output, which until recently amounted to about 93,000 metric tons per day, has recently declined to approximately 89,000 tons. The causes for this decline are chiefly absenteeism and the fact that many foreign miners find it difficult to adapt themselves to Belgian conditions. Of 45,000 Germans who worked in the Belgian mines last year, only about 3500 are now available.

New Magnesium Fertiliser.—The Molina di Ledro factory near Trent in Italy, has launched a new fertilising product called Fim Fertiliser. This is based on phosphorus (5 per cent), magnesium (hydroxide 14 per cent, free oxide 4 per cent), and calcium. Argument for and against magnesium fertilisers has been going on in Italy for some time, but the Molina factory is confident enough in its new product to start large-scale distribution. Free samples are being sent to farmers.

Canadian Tin Plant for Chile.—A complete second-hand tin plant was shipped in August from Montreal to Valparaiso. The plant was formerly located at Sault St. Marie, Ont.

Prague Fair.—Russian exhibits are the principal feature of the autumn trade fair now being held in Prague. Machines being shown by the Soviet Union vary from aircraft and omnibuses to a drilling apparatus capable of boring to a depth of 3000 metres.

Groundnuts Hold-Up.—Some 262,800 tons of groundnuts, enough to make at least 100,000 tons of margarine, are stated to be waiting to be gathered in Northern Nigeria, but unless new locomotives and rolling-stock arrive to reinforce the 700-mile narrow-gauge, single track railway to the coast, it will take a year to move the nuts.

New Mica Mill.—Completion is expected this autumn of a new mill at Newport News, Va., for the manufacture of sheet and ground mica by the Mica Co. of Canada, Inc. When completed the company intend to remove plants at Massena, N.Y., and Asheville, N.C., to the new location, where operations will be concentrated in future.

Oil Palm Prospects.—The expectation of a strong demand for some years for vegetable oils and copra and palm products was reported by Sir Eric Macfadyen, chairman, in his address at the annual general meeting in London of the Straits Plantations, Ltd. It was proposed to resume work on the expansion of the Sungei Samak oil palm estate, where first clearings gave results which showed that the soil grows first-rate palms.

More Japanese Steel.—According to official Japanese sources, output of steel ingots and sheets amounted to 177,000 tons and 217,780 tons, respectively, in the first quarter of this year, the highest figures since the end of the war. The target for steel sheets was reached because of larger supplies of electric power, but inadequacy of iron-ore imports and of coal from the Russian authorities has made it impossible to fulfil the ingot target.

Sicilian Sulphur Dwindles.—Sicilian sulphur mines during the financial year 1946-47 produced only 100,407 tons of sulphur. Ever since 1900 when the output amounted to some 500,000 tons the production of sulphur in Sicily has been declining in the face of competition from the U.S.A. Sulphur realises about \$22 outside Italy; its guaranteed price in Italy is equivalent to about \$54, and even this does not cover the costs of production.

Nitroglycerine Explosion

Workers' Timely Escape

An explosion occurred at the I.C.I. factory, Ardeer, Ayrshire, on September 13. Some employees were injured by flying debris, but the injuries were of a minor character. Safety measures and prompt action enabled three men working where the explosion occurred to make their escape. The explosion took place in the No. 3 Hill, which is one of the dispersed production units for the manufacture of nitroglycerine. A company official stated that the man in charge of the nitrator had just added 200 lb. of glycerine when he saw red fumes issuing from the nitrator plant. Recognising this danger signal, he immediately called to the two men working the separator, and they escaped. The nitrator exploded first, followed shortly afterwards by the separator.

INCREASING CHEMICAL MANPOWER

An interesting comparison of the numbers of persons employed over the period mid-1939 to June, 1948, appears in the industrial analysis tables published in the Ministry of Labour gazette for August, 1948. The following extract shows a steady upward trend since 1947 for the chemical and related industries as a whole. Figures are shown (in thousands) in the following sequence, mid-1939; mid-1945; mid-1947; June, 1948: Coke ovens and by-product works: 12.4; 12.7; 13.7, 14.4. Chemicals: 124.8; 157.5; 187.9; 192.7. Explosives: 37.1; 168.1; 34.6; 33.6. Paint, varnish, etc.: 26.9; 23.4; 30.0; 31.8. Oil, glue, soap, ink, etc.: 83.2; 75.8; 81.6; 85.0. Total chemicals, 284.4; 438.1; 347.8; 357.5.

Swifter Telegrams

A revolution in the telegraph system of Great Britain has taken place during the past four years.

Formerly a large proportion of messages had to be transmitted at intermediate offices. A telegram from Brighton to Dumfries, for example, would be transmitted three times: Brighton to London, London to Glasgow, and Glasgow to Dumfries.

Under the new switching system, Brighton is provided with a direct teleprinter circuit to each switchboard, and the telegraphist at Brighton requiring Dumfries, would call Glasgow switchboard and ask by teleprinter to be extended to Dumfries. Connection is made with cords and plugs in the same way as telephone calls are made on a telephone switchboard.

Portuguese Wolfram Decline

Continuance of German Direction?

THE Portuguese wolfram trade has fallen away from wartime boom proportions almost to a moribund condition. At the present price of 105s. to 110s. per unit, Portugal cannot compete in world markets and production will be restricted to the Beral and Borralha mines and perhaps to the group of mines developed by the Companhia Mineira de Portugal, writes the Oporto correspondent of the *Mining Journal*.

The report alleges that the last-named group, which was developed by the Germans during the war, has slipped through the net of the Allied Commission now liquidating enemy mines, although the commission is said to have "some sort of right" to supervise sales and output of the Cia. Mineira. However, since the group's power station at the Vale das Gatas mine—which is reported to have cost the Germans at least £50,000 to erect—has recently been gutted, it is likely that output at this important centre will be impeded for a long time.

The matter, says the Oporto correspondent, should not be allowed to rest there and should German interests "have got away with it" again in one way or the other, action should be taken without delay to liquidate any German influence in the Portuguese wolfram mining industry.

[The price of wolfram, quoted in London this week to have risen 2s. 6d. to 100-107s. 6d. nominal per unit, c.i.f., European ports.]

CANADIAN WOOD WASTE INDUSTRY

CONTRACTS have been signed for the construction of a "Plaswood" plant at South Nelson, N.B., the first such plant in Canada, it is indicated in a joint announcement by Mr. Alfred H. Paradis, Montreal, Mr. H. I. Hymans, of Detroit, and Mr. J. L. O'Brien, of South Nelson. Plaswood, it is explained, is the result of 10 years' research and development in the United States. The process converts all kinds of wood waste into a wide range of wood products through the use of special drying equipment and the mixture of a synthetic resin. The right to the process in Canada will be acquired by a new company to be known as Plaswood Corporation of Canada, Ltd. The South Nelson plant, which is expected to be in operation within six months, will be the first to be licensed by the new company. Other plants are expected to be built throughout Canada.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

R. A. CLEMENTS (LONDON), LTD. (formerly REGINALD MAURICE, LTD.), (M., 18/9/48.)—August 12, £3,000 (not ex.) mortgage to Lloyds Bank Ltd.; charged on lease of 5 Blenheim Street, Westminster. *Nil. April 23, 1947.

COPPER & ALLOYS, LTD., West Bromwich. (M., 18/9/48.)—August 4, further charge, to N. M. Rothschild & Sons further increasing the limit secured by a charge dated July 19, 1940, and deeds supplemental thereto from £180,000 to £360,000; general charge. *£80,000. July 16, 1947.

Receivership

GOLDEN VALLEY CHEMICAL WORKS, LTD., 20 Gloucester Road, Stroud. (R., 18/9/48.) Mr. John G. Sporni, 36 Doughty Street, W.C.1, was appointed receiver and manager on July 23, 1948, under powers contained in debentures dated July 19, 1947.

Company News

The name of **Midland Paint & Varnish Co., Ltd.**, 34 Market Place, Long Eaton, has been changed to **Eaton Paint & Varnish Company, Ltd.**, as from August 11, 1948.

The nominal capital of **Indo-British Industries, Ltd.**, 30 Sussex Place, London, W.2, has been increased beyond the registered capital of £100, by £900 in £1 ordinary shares.

The nominal capital of **Quickset Products, Ltd.**, 67-69 Tower Bridge Road, London, S.E.1, has been increased beyond the registered capital of £600 by £2400 in £1 ordinary shares.

The nominal capital of **Rushborne Developments, Ltd.**, The Manor House, Feckenham, Worcs., has been increased beyond the registered capital of £2000 by £18,000 in £1 ordinary shares.

The consolidated accounts of the **Triplex Safety Glass Co.** for the year ended June 30 show current liquid assets of £1,050,591 (compared with £919,518 last year) and liabilities of £224,945 (£151,670). Revenue reserves and undivided profits are £284,783 (£266,358).

New Companies Registered

Tudor Jones (Chemists), Ltd. (458,556).—Private company. Capital: £2000. Manufacturers of chemicals, gases, etc. Directors: G. T. Jones, 10 Springfield Crescent, West Bromwich; and C. H. Smith. Secretary: G. T. Jones.

M. L. Alkan, Ltd. (458,647).—Private company. Registered September 9. Capital £10,000. Manufacturers of and dealers in chemicals of all kinds, etc. Directors: Max L. Alkan and Mrs. K. Alkan, both of 15 Courleigh Bridge Lane, N.W.11. Secretary: G. L. Castle.

Redman Chemical & Physical Instruments, Ltd. (458,654).—Private company. Registered September 9. Capital £100. Chemical, electrical and mechanical engineers, manufacturers of and dealers in chemical, physical, electrical and mechanical apparatus, equipment, etc. Directors are: Henry C. Redman, Florence E. Redman and John C. Redman. Reg. office: 53 Canning Road, Wealdstone, Middlesex.

Chemical and Allied Stocks and Shares

STOCK markets remained cautious, owing to international uncertainties, and, with buyers holding off, values in most sections eased, although little selling was reported. British Funds were unable to move against the general trend, including the nationalisation stocks, 3 per cent Transports receding to 99 1/16, after touching the new high level of 99 1/4. The TU Conference had little effect on sentiment, but there was relief that indications are that no legislation is likely to limit profits and dividends. It is now generally recognised that leading industrial companies have loyally followed the dividend limitation request. Moreover, results which fall to be published over the next six months will in many instances be the first to reflect the reduced profits of a wide range of companies owing to lower retail prices in the home market and the reduced spending power by the public.

Imperial Chemical have been firmer at 44s. 4 1/2d. with the new shares better at

3s. 3d. premium, scattered selling having now ceased on the part of those who did not wish to pay the first call of 20s. These new shares will not become fully paid (they were issued at 40s. 6d.) until October 28 when the final call of 20s. 6d. is due. The yield of nearly 4½ per cent on Imperial Chemical still seems attractive when compared with the return on some other leading industrial shares, and the new shares are a slightly cheaper purchase than the old shares.

Monsanto Chemical 5s. shares have been firm at 58s. 9d., and B. Laporte 5s. ordinary were again 20s. 6d., with Albright & Wilson 5s. shares at 29s. Amber Chemical 2s. shares changed hands around 9s. 9d., and Fisons around 59s. Boake Roberts 5s. shares transferred at 30s., while W. J. Bush 5 per cent preference marked 27s., and Burt Boulton ordinary 25s. 3d. British Glues & Chemicals 4s. ordinary have further strengthened to 21s. following news of the company's developments in Canada. Amalgamated Metal shares were firmer at 19s. 7½, the yield of rather more than 5 per cent bringing in buyers. Moreover, in other directions, Borax Consolidated at 60s. have held their recent rise, while British Match were 35s. 6d., and British Oxygen 39s. 4½d. Elsewhere, De La Rue at 40s. turned dull with the yield now fully 6 per cent on the basis of last year's 50 per cent dividend on these 5s. shares. At 76s. 6d., Turner & Newall remained steady. United Molasses were 47s. 9d., Lever & Unilever 49s., and General Refractories 10s. shares were 22s. yielding 4½ per cent, last year's dividend having been 10 per cent. British Drug Houses 5s. shares continued to be quoted at 9s.

Despite expectations that the Government will shortly introduce its Nationalisation Bill, iron and steel shares were generally fairly steady, movements not exceeding more than a few pence. Guest Keen have eased to 47s. 9d. United Steel were 28s. 3d. at which the yield is nearly 5½ per cent, and the market expects forthcoming results to show maintenance of the dividend at 8 per cent. Dorman Long were 31s., but Stewarts & Lloyds eased to 54s. 6d., and Thomas & Baldwins 6s. 8d. ordinary were 44s. 6d. Colliery and kindred shares have been firm and more active on latest market estimates of their ultimate compensation "break-up" values. Staveley have been particularly prominent at 83s. 6d. on renewed market expectations that the forthcoming capital repayment by Doncaster Amalgamated Collieries (in which Staveley has a 40 per cent interest) will mean later on a special return to Staveley shareholders. The market is assuming, how-

ever, that Staveley is likely to retain a good part of its cash resources because of the possibility of further acquisitions in the chemical industry from time to time. In other directions, Boots Drug 5s. ordinary were firmer at 52s. on the assumption that business will expand as a result of the National Health developments. Oil shares have been uncertain with Shell at 75s. 7½d., and Anglo-Iranian £7½

British Chemical Prices

Market Reports

THE absence of any important developments in the home industrial chemicals market leaves the general position more or less unchanged. Values throughout are steady and the demand from the leading industrial consuming industries has been sustained. Inquiries for shipment, too, have been fairly widespread and the export market for chemicals remains at a satisfactory level. In the soda products section there is a ready market for chlorate of soda and bichromate of soda, while the demand for soda ash continues in excess of the quantities available. In other directions there is a good call for hydrogen peroxide, acetone, formaldehyde and arsenic and an active demand has been maintained for the lead oxides. In the coal-tar products market business continues on a good scale with buying interest sustained in cresylic acid, crude carbolic acid and pitch.

MANCHESTER.—Steady or firm price conditions continue in virtually all sections of the Manchester chemical market, and in respect of demand, trading has been satisfactory during the past week. Pretty well all classes of alkali and ammonia products are being called for in good quantities, while a full absorption of available supplies of most of the potash chemicals is also reported. Current inquiry covers a fairly wide range of other light and heavy products from domestic consumers, and a steady trade is passing on overseas account. Considering the time of the year, the movement of supplies of fertilisers is fairly satisfactory, and a continued steady demand for the light and heavy tar products is a feature.

GLASGOW.—There has been little change in the Scottish chemical market during the past week. Demand has been fairly well maintained over the whole range of chemicals, and prices have remained steady. The export market continues to show activity and produces a steady flow of inquiries and a fair percentage of orders.

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NEGLECTED NEEDS OF INDUSTRY

THE Grand Council of the Federation of British Industries last week heard the report of the president, Sir Frederick Bain, on the discussions which he had had with Sir Stafford Cripps on the subject of increasing industrial productivity. The council endorsed the action taken by the president and decided to appoint at once a production committee to advise what further steps the federation should take. At the same time, the council recorded its view that success would be inevitably limited so long as present restrictions on capital expenditure were maintained. Even within the limits prescribed by the balance of payments problems, industry could not safely be left much longer as the residuary legatee, whose claims for capital expenditure were the last to be met.

Deep Sea Exploration

A new expedition to explore the ocean depths in the Gulf of Guinea is being undertaken by Prof. Auguste Piccard and his assistant Prof. Max Cosyns. The bathysphere—a 10-ton steel diving-bell—will be lowered off Cape Verde. It is hoped to study the effects of cosmic rays at great depths, and Prof. Cosyns will also examine the chemical composition of the sea at various depths.

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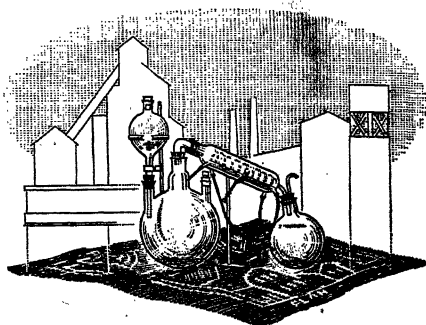
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In Search of Energy

IT is self-evident that the world now needs higher production of almost everything. There are chemical methods of increasing rates of reaction, which (if we exclude certain physical factors such as temperature and pressure) resolve themselves into the use of catalysts. There may, too, be moral "catalysts" which will resolve the stubborn problem of getting more work done, but it is highly doubtful if there is any moral agency that will enable even the most tireless worker to produce double his output in a given time. There is only one way to do that, and that is by increasing the power at his disposal. That implies a fuller use of energy derived from outside sources, of which the most abundant still is coal. Tomorrow it may be power derived from the atom, but for the moment, it is sufficient to think of coal and the next step after coal.

The oil supplies of the world are being worked out at an uncomfortably rapid rate. The U.S.A. is thought to have sufficient only to last her for not more than two or three decades, and the other sources of oil in the world are not inexhaustible. Oil and natural gas are at the same time the promising storehouse of raw materials for an expanding chemical industry, as well as being a very important source of the energy required to maintain nearly all the processes. The immediate evidence is that coal deposits, too, will suffer the fate of the oil reserves in a measurable space of time.

Whence, then, shall we get our supplies of carbon?

Dr. Levinstein has answered, in principle, "from the new developments that may be expected from organic chemistry." Carbon dioxide and methane, he points out, are not only our two basic raw materials but they are also the beginning and the end products respectively of the complex cycle that living matter undergoes. The experiments conducted by the late Prof. Baly at Liverpool on the conversion of carbon dioxide to formaldehyde and sugars, while not successful on any practical scale, propound a problem of great technical interest that, in Dr. Levinstein's view, "in another generation or less may be a vital matter. It is a problem to be tackled now with adequate means in the laboratory." It would yield energy in the form of food by chemical processes that now take place only slowly through the agency of plants. To no country would it be so important as to Britain, having relatively a large population and few acres. Here, it would seem, is a problem of energy that deserves the unstinted attention of chemists, predominantly by those in a Government laboratory or the Universities. The first step must be an advance in the pure chemistry of the subject.

Problems of coal production and availability must be left to the experts in mining and fuel technology. The physicist will have much to say about the replacement of

On Other Pages

Leader :

In Search of Energy ... 405

Notes and Comments :

The New "Incentive" ... 407

Another Silent Service ... 407

American Method ... 407

Health and Work ... 408

Thermal Economy ... 408

The Widening Field for Phosphorus 409

Facilities for Industrial Studies in

Japan ... 409

French Potash Discoveries ... 410

Spanish Chemical Expansion ... 410

Indian N-F Metal Policy ... 410

Europe's Chemical Trade under ERP 411

Registering Patents in Germany ... 413

British Plant at Copenhagen ... 414

Growth of the Plastics Industry ... 416

Health Safeguards in Industry ... 418

New Mass Spectrometer ... 420

New Source of Synthetic Alcohol ... 423

Another Phthalic Alkyd Resin ... 423

Technical News and Services ... 425

Radioactivity and Engineering Dis-
cussions ... 427

Vegetable Oils of Africa ... 432

German Patents ... 432

Prices of British Chemical Products 433

Oil from Rubber Seeds ... 438

coal by other forms of energy, if coal becomes either too scarce or too expensive. In the U.S.A. research into atomic energy problems is being pursued with enthusiasm and almost without regard to expenditure. In some respects American discoveries are shared with us, but how far that co-operation extends few are able to say. Other countries are engaged in the search, and it is unthinkable that so great an expenditure of effort will not eventually bring beneficial results. It is inevitable that atomic research should be pursued primarily by Governments, private individuals not having the necessary funds to purchase and fabricate the huge equipment, but it is none the less unfortunate that here the Government is in control. The salaries paid at Harwell, according to the information published recently, are on a Civil Service scale, and are inadequate to attract and keep the best men. Senior scientific officers, we are told, possessing a 1st or 2nd class honours degree and at least three years post-graduate experience, get £620 to £810 a year. That does not sound to be the scale on which to generate energy, atomic or of the commoner kind.

The search for uranium, too, is employing many geologists and others, but none is yet in a position to say whether there will be enough uranium to go round for many years. Means for extracting uranium from poor ores seem the most

hopeful line of research at the moment. In South Africa, the interesting discovery has been made that uranium is associated with gold-bearing rocks. Uranium production is State-controlled, and the State is co-operating with the gold-mining companies to secure the residual uraniferous material. Extraction is difficult, but so was the extraction of gold until the cyanide process was discovered.

So, all over the world, the search for energy goes on. Some are seeking new means of using energy, or ways of increasing output a manifold by employing more energy. Others are seeking to make available energy adequate by using it more efficiently, while a few hope to reveal new sources of energy. We have to face many problems, but that of energy is perhaps the most widespread and important of all.

Marshall Plan Surveyed

Ernest Benn, Ltd., will publish on October 4, a pamphlet entitled "The Meaning of the Marshall Plan," by Sir Arthur Salter, M.P. After giving a concise outline of the plan and what it replaces, the author discusses America's motives and the next steps to be taken on this side of the Atlantic. In a concluding section the reader is given a clear idea of the situation that is likely to face this country when the Marshall Plan expires in 1952.

NOTES AND COMMENTS

The New "Incentive"

THE selection by the President of the Board of Trade of the increases in chemical production to lend point to his arguments in the House of Commons last week in support of the Government's economic programme will seem to some to have been in the nature of an afterthought. To those who have followed the subject consistently it is a commonplace that what chemical industry is doing is seldom cited as evidence, regardless of the very healthy expansion which has taken place since the ending of the fuel crisis of 1947 made development feasible, and of the increasingly large proportion of overseas earnings derived from the products of our chemical plants. The 19 per cent export increase achieved by chemical industry in the second quarter of this year compared with the same quarter a year ago has now been officially recognised by Mr. Harold Wilson as ranking among the "really remarkable achievements." The belated acknowledgment would convey a good deal more satisfaction if the speaker and those who support him were prepared to admit the real sources of those improvements, which are very gradually permitting a slightly more hopeful outlook on the general picture of national earning-power and indebtedness. According to Mr. Wilson, the stimulation of export trade to reach (in July last) 149 per cent of the 1938 volume is due to "what the Government has done to provide markets." So far as chemicals are concerned, that explanation is about as unreal as Mr. Wilson's earlier implication that the splendid record of increasing iron and steel production over many months is somehow associated with the approach of nationalisation.

Another Silent Service?

SIR ROBERT WATSON-WATT, invited last week to open the exhibition provided by the Oxford branch of the Association of Scientific Workers, initiated at the same time something of very much wider import—by his somewhat minatory reference to what, in his view, represents the duty of scientists as a whole to the rest of the community. His doctrine is that there must be a fundamental change in the

relationship between scientists and the public, and unless scientists themselves promote a mutual interchange "of thought and understanding" between the scientific worker and the "consumers," on the intellectual or the material plane, it will be the worse for the scientists. He is reported as having indicated that some of that trouble would come from the political sphere. The effect of that declaration is unfortunate because it conveys—perhaps unwittingly—the flavour of scientific enterprise subordinated to "the will of the people," and that philosophy is reported to have produced some ludicrous and rather nauseating results in the Soviet science world. That impression is all the more regrettable because his theme the need of better liaison and understanding is one to which all scientists who have had the leisure to think at all about it would probably subscribe.

American Method

FEW laboratory workers will see much prospect of fruitful results of a sort of "shotgun wedding" between scientists and the rest. Prudence and charity both suggest that Sir Robert had not that in mind. There are, of course, other ways of acquainting the public with the benefits they receive from the work being done in the laboratories. The most active exponents of that policy are the organised chemists of the U.S.A., who are responsible for a general news service in "tablet" form. This, for palates accustomed to news in highly concentrated and well coloured doses, is probably better than the relatively meagre intellectual rations provided for general consumption here. It has, however, all the characteristics of an indigenous American growth which would not survive transplanting. Meanwhile, science news in the general Press in this country is better and more fully reported than ever before. It is, even so, a good deal short of what the tempo of events justifies. Given a lot more newsprint and a little more collaboration from the scientific workers themselves, all but a very small minority of national and provincial newspapers could be trusted to bridge all those chasms which may seem to divide the scientist from others, whenever the intelligible communication of ideas is feasible.

Science in a Strait-Jacket

THE closer relationship between political forces and the scientist has been raised, not inopportunistically, in another place by Mr. George V. Allen, U.S. Assistant Secretary of State for Public Affairs, discussing the progress of science and the dissemination of scientific knowledge at a meeting of the American Association for the Advancement of Science. He said he gloried in the criticism of any violation of academic freedom which occurs in the U.S.A. On the international plane, he said, science had in some places fallen a victim to Communism's strait-jacket. That, as he pointed out, is not peculiarly a phenomenon of this century. "The pages of history are full of the names of the martyrs of science who have suffered persecution because of their steadfast adherence to evidence as revealed through their experiments. . . . To-day the long-suffering scientists of Moscow are forbidden to reach their own conclusions on the teachings of Mendel or Lamarck," said Mr. Allen.

Health and Work

THE closing session, on September 17, of the Ninth International Congress in London on Industrial Medicine, left no doubt about the great improvements which have been made in recent times in working conditions in industrial plants in Britain. The Rt. Hon. Lord Webb-Johnson (president of the Royal College of Surgeons), who has witnessed so many of these advances, is still acutely aware of what still remains to be done to protect the health of employees, especially those engaged in dangerous sections of industry, the manufacture of certain chemicals and—a more recent challenge—work involving close proximity with radioactive substances. He believes more in preventive measures, which clearly deserve more attention even than remedial work, admirable as are some of the aids to convalescence afforded by industrial organisation. Lord Webb-Johnson presented a picture of working conditions in, for example, potteries, a few decades ago when, in his youth, he first realised the evils that existed in industrial plants, such as exposure to the risk of poisoning, about which very little was done in those days. Those bad old conditions had gone, he said, very largely because of

the work of the pioneers. If such phenomenal advances have been made in one lifetime, what vastly improved conditions may be looked for in the future in the more enlightened co-operation which is now fostered alike by modern ethics and technology?

Thermal Economy

WHATEVER hard words the heavy industries have cast at the Ministry of Fuel and Power in respect of past demeanours and misleading advice, only the vindictive can withhold respectful recognition of the sound practical aid which that department has rendered since its Fuel Efficiency Committee published Fuel Efficiency Bulletin No. 1 (Steam Production and Consumption) in the series of which No. 51 just issued, is a specially apposite addition. The cynic may observe that the circumstances which make this bulletin—on the economies of fuel and finance to be secured by "Heat and Power Linkage"—have reached a peak under the administration of the same Ministry, but that does not minimise the value of the essentially practical evidence marshalled in the pamphlet of how the sharing principle can be extended to enable the heat and power needs of neighbouring plants, not necessarily in the same industrial category or contiguous, to be supplied from one source. The advantages are self-evident and are magnified by the present high costs and uncertainties of power production, which exercise a ruling influence in determining the practicability of many contemporary projects. Best of all, this is far from being a collation of theories, consisting, as it does, very largely of concrete instances of how the superabundance of one plant's heat producer can be utilised by "steam linkage," or the piping of hot water, with suitable insulation, to supply another's needs, recouping a good part of its own costs in the process. Coke ovens and blast furnaces are conspicuous targets for this form of conservation, which is, of course, not confined to the high- or low-grade heat. The better use of by-product gases and economical production and distribution of electrical power by collaboration among contiguous groups are capable of being expanded far beyond the scope of present uses, the basic facts and figures of some of which are presented now.

The Widening Field for Phosphorus

Fresh Adaptations for U.S. Industry

FOURTEEN additional phosphorus chemicals, seven of which are already being produced in commercial quantities, while the others are in the state of works or in laboratory development, have been developed by the Victor Chemical Works, New York, and will be available this autumn, the company announced last week. Of the 14 chemicals, 12 are organic phosphorus compounds, and indicate the emphasis now being placed on organic phosphorus chemistry by the company's research group.

The experimental study of the preparation of the phosphorus-containing insecticides has led to the availability for commercial use of several technical chemicals which are suitable as intermediates for organic synthesis. These include the dialkyl phosphoric acids which are reactive substances, soluble in organic solvents and which are useful for the introduction of phosphorus into many complex organic compounds. Exhaustive study of the alkyl phosphoric acids has led to the discovery of a group of surface-active compounds which have been found to be suitable for use as wetting agents and detergents.

Several of these compounds are already in commercial production, and are being employed for a variety of purposes. One is a phosphorus-containing detergent of the non-

ionic type which possesses a very high cleaning power, particularly when formulated with a complex phosphate builder. This product, being a very low foamer, is especially valuable for commercial laundry use.

Another unusual application of the same class of compounds was developed because of the necessity for increasing the light stability of transparent films. Several of Victor's alkyl phosphates are now used as stabilisers for vinyl plastic films, in the manufacture of table tops, raincoats, upholstery covers and similar articles.

Rapid Curing Plastic

Among the company's accomplishments in the organic field is the development of an organic phosphorus-containing plastic known as Phoresin. Continued efforts to improve the commercial possibilities of this plastic have resulted in the production of materials which can be cured in a matter of minutes, instead of several hours.

In addition, this research has resulted in the development of methods suitable for the manufacture of several intermediate chemicals including benzene phosphorus dichloride, benzene phosphoric acid. Several interesting commercial outlets for these chemicals have already been developed.

Facilities for Industrial Studies in Japan

FULLER facilities for the study of technical and industrial processes developed in Japan before the end of hostilities have been made available as a result of a decision taken by the Far Eastern Commission in Washington. The new measures, which are additional to the provision represented by the technical reports already compiled by the Allied information services, have effect from July 1 this year until March 31, 1949.

During that period, states the *Board of Trade Journal*, the commission's ruling is that "technical representatives of the Governments of members of the Far Eastern Commission should be permitted access to and the right to take copies of the details of any technical or scientific processes of industrial or commercial value which are of Japanese origin and ownership, and which were developed prior to December 31, 1945.

Technical or scientific information obtained by any representative of the Government of a member of the Far Eastern Commission pursuant to this policy statement should be

promptly and fully disposed to the Supreme Commander for the Allied Powers for dissemination to other interested members of the Far Eastern Commission upon specific request."

Representatives allowed to enter Japan under this scheme will be restricted to a small number by the Supreme Commander for the Allied Powers. In view of this and the fact that the operative date for the beginning of the scheme was July 1, interested firms are asked to apply as soon as possible to Export Promotion Department, Thames House North, Millbank, London, S.W.1, for further particulars.

Italian Chemical Employment.—According to the latest statistics, only 14.1 per cent of workers in Italian chemical industry are unemployed. This compares very favourably with other industries (building industry 45.6 per cent, woodworking 42.8 per cent, mining 25.07 per cent).

French Potash Discoveries

Prospects of Petroleum

THE discovery, in Les Landes (France), of formations which appear to be fairly rich in potassium salts, and also offer indications of petroleum, is described by V. Charrin in a recent issue of *Chimie et Industrie*. Potash discoveries in this region, notably at Boudigot, had, in fact, been announced in 1937, but little was done until the war stimulated development work.

Galleries were opened at depths of 200 to 400 m. and then at 635 m. Deposits at between 260 and 400 m. depth were estimated at about 800,000 tons, and 40,000 tons of ore of 12 per cent pure potash were produced. At the lower depth (400 m.) richer ores were found of 18-22 per cent potash, and sometimes up to 30-32 per cent. It is suggested that additional shafts should be sunk to these lower levels and beyond, especially as there is a possibility of petroleum, despite the fact that many soundings already made in Les Landes and the Basses-Pyrénées had proved negative, even at considerable depth.

Geological Evidence

Without taking into account the fact that the Pyrenean trias may be locally petroliferous, there is a very close analogy between the Stassfurt potash formations, below which petroleum sands were found, and those of Boudigot. The analogy is not, of course quite complete, for in Les Landes the geological age is undoubtedly triassic, while at Stassfurt it is permian, but this difference is not regarded as material, for other geological factors are more pertinent and in favour of the petroleum theory.

Potash deposits both on the Spanish and the French sides of the Pyrenees have, as is well known, proved of considerable interest during many years past. On the Spanish side they have been exploited at Surria and Cardona, and indications were also discovered at Pampelune.

On the French side indications have been found in various districts, notably at Salles-de-Béarn, Castagnède, and at Oraas. A sample ore from the latter district obtained at 500 m. gave, on analysis, hydrated magnesium chloride 42.8 per cent, potassium chloride 24 per cent, sulphuric acid 19.3 per cent.

Reference is also made to the so-called hippodrome of Peyrehorade where fairly rich potash deposits—syvinites and potassium chloride—were found in 1927-8 between 450 and 482 m. These discoveries are said to have been made in the search for petroleum, and as this latter proved negative, like a great many others in France, the potash was then practically ignored.

Spanish Chemical Expansion

Many Building Projects Authorised

THE number of applications for permits to build new factories or to extend indicate that the Spanish chemical industries are in a rapidly expanding and progressive condition. Although by no means all applications received by the various Juntas are granted, during the half-year ended June 30, 1948, no less than 318 new factories and 132 extensions were authorised. Details are given in ION for July, and some of the principal may be tabulated as follows:—

	New factories	Extensions
Acids, salts and other inorganic chemicals	54	14
Lyes and alkalis	12	6
Detergents	7	
Caustic soda	4	1
Metalloids, gases, and electro-chemistry	50	18
Ice	31	14
Phosphates	2	
Fertilisers	13	4
Miscellaneous	6	3
Ammonium chloride	3	
Organic, miscellaneous	6	2
Distillation	6	5
Amyl and ethyl acetates	2	1
Pharmaceutical	28	25
Insecticides	5	2
General	18	20
Adhesives	10	7
Plastics	42	3
Moulding materials	31	
Synthetic resins	9	3
Rubber	41	25
Reclaiming and vulcanising	34	12
Perfumery	35	
Dyes	20	1

INDIAN N-F METAL POLICY

PROTECTION for the non-ferrous metals industry for three years is favoured in the report of the Indian Tariff Board accepted by the Government of India.

Among the primary metals dealt with, copper is regarded as most important and the board's main recommendation was that unwrought copper, copper scrap, lead ingots, lead scrap, zinc ingots, slabs, blocks or bars and zinc scrap should continue to be free of import duty. The duty on tin, tin scrap and tin plate scrap, nickel and nickel scrap, cobalt, chromium, tungsten, magnesium, muzzak and scrap of all other non-ferrous metals and alloys should be removed.

A protective duty to remain effective until March 31, 1950, should be levied on brass ingots; zinc and lead sheets; yellow metal alloys, other than brass, tin solder; other white metal alloys type metal, nickel alloys, brass sheets, etc.

EUROPE'S CHEMICALS UNDER ERP

New Opportunities Opened by Marshall Aid

NOW that provisional agreement has been reached on the distribution of Marshall Aid among the countries participating in European Economic Co-operation under the terms of the European Recovery Act, it may be opportune to try to estimate the effect of U.S. assistance grants and loans combined with mutual help among the recipient states on chemical products.

Some raw materials for the manufacture of chemicals and chemical fertilisers are among the commodities which have been allocated to OEEC countries, and U.S. stock-piling of strategic commodities made available by participating states will also include some materials of chemical interest. Marshall Aid funds, however, will not, as far as can be seen at present, be used to an appreciable extent for the purchase or supply of chemical manufactures as distinct from basic materials used in chemical processes. Any expansion in the demand for finished or semi-finished chemical products therefore depends on the stimulation of economic activity in OEEC countries and commercial intercourse between them by the influx of U.S. aid.

Chemical Exchanges

There appear to exist considerable opportunities for an intensification of chemical exchanges among the states participating in European Economic Co-operation. Before the war, OEEC countries (including Germany) supplied two-thirds of all chemicals and allied products crossing national frontiers anywhere in the world, and the same group of countries absorbed more than two-fifths of all chemicals entering international trade. Despite the steady expansion of chemical requirements in overseas countries, a substantial proportion of the world trade in chemicals took place within a comparatively small area of North-West Europe, and from this area was also supplied the bulk of the chemical products imported into eastern Europe, the British Empire and the western hemisphere.

War and post-war changes have seriously affected the position of North-West Europe as the chemical workshop of the world. Chemical exports from the U.S.A. at least doubled in volume between 1937 and 1946. Last year U.S. chemical exports increased further by more than half in value to \$783,000,000, and the export figures for the early months of this year indicated a further advance.

It is by no means impossible that the U.S.A. will export this year an amount of chemical and allied products equivalent in terms of sterling to the total world export trade in chemicals in one of the best pre-war years. The expansion of Canada's chemical exports has been similarly impressive. The North American continent thus bids fair to usurp Western Europe's position as chief exporter of chemical products.

Contraction of Exports

In Europe, war and post-war influences have had a twofold effect on foreign trade in chemicals. Most Continental countries have witnessed a shrinkage in the volume of chemical trade as a whole, and this decline has generally been more marked on the export side than for imports. Between 1938 and 1946 French chemical imports increased from 1,311,790,000 francs to 9,229,150,000 francs, and her exports from 2,904,420,000 to 12,472,270,000 francs. In 1947 imports rose to 11,390,490,000 and exports to 20,499,950,000 francs. All these figures, of course, are distorted by currency devaluations. In January-May, 1948, France imported 6,390,860,000 francs' worth of chemicals (against 4,323,070,000 francs in January-May, 1947) and exported 12,715,970,000 (8,857,930,000) francs of chemicals. If allowance is made for price changes, it would appear that France's chemical imports are now, perhaps, one-quarter below the pre-war volume; her export trade in chemicals fared rather worse. The position would no doubt have been even less satisfactory but for the latest currency devaluation.

Dutch Imports

The Netherlands import trade in chemicals increased from 137,394,000 florins in 1938 to 252,700,000 in 1946 and 401,700,000 florins in 1947, while Dutch chemical exports fell from 105,469,000 florins in 1938 to 71,700,600 in 1946 and recovered to 191,900,000 in 1947. This year Dutch imports and exports in January-April included 104,857,000 and 58,513,000 florins of chemicals. In volume chemical imports into Holland are still below the pre-war level, and Dutch chemical exports are, of course, far below the pre-war volume.

Belgium fared much better than her two neighbours. Chemical imports rose from 857,844,000 francs in the average of 1936-38 to 2,219,614,000 francs in 1946 and 3,193,105 francs in 1947, while Belgian exports of chemicals rose from 1,456,032,000 francs in

1936-38 to 2,348,906,000 in 1946 and 5,488,812,000 francs in 1947.

Her chemical imports have thus already surpassed the pre-war volume, and Belgium's chemical export trade showed a remarkable recovery last year. In January-May of this year Belgian chemical imports and exports rose further—to 1,773,974,000 francs (compared with 1,227,303,000 francs in January-May, 1947, and 2,976,708,000 (2,019,556,000) francs respectively. That Belgium's chemical trade has developed so much more satisfactorily is due firstly to the country's favourable currency position, which has permitted a more liberal foreign trade policy, and also to the large part which chemical fertilisers are playing in Belgian chemical exports. The latter now account for half of Belgium's chemical export trade.

Chemical exports from Germany are still small. During the first three months of the current year the Anglo-U.S. zone of occupation shipped 6,645,000 dollars of chemicals abroad, mainly basic inorganic chemicals and dyestuffs. The pharmaceutical export trade is still very small. The French zone has an efficient chemical industry and will in due course make a growing contribution to Europe's chemical needs, but the Soviet zone production of chemicals seems to go mainly to Eastern and South-eastern Europe, though chemicals from factories in Saxony-Anhalt are being sent to other countries as well under recent trade agreements. Raw material, fuel, electricity and container shortages are retarding the recovery of the West German chemical export industry, and German quarters also complain that dismantlings have affected the peacetime potential of their chemical industry.

Switzerland

Swiss chemical exports rose from 204,021,000 francs in 1938 to 404,464,000 francs in 1946 and 562,616,000 francs in 1947. Swiss chemical imports have risen in proportion and amounted to 225,221,000 francs in 1946 and 289,426,000 francs in 1947. In January-June, 1948, her imports rose to 171,583,000 francs (compared with 144,686,000 francs in the first half of 1947), while Swiss chemical exports declined to 149,652,000 francs (compared with 167,963,000 francs). This decline occurred although Switzerland's exports of dyes and intermediates continued to increase and in the first six months of this year amounted to 25,624,000 (19,185,000) francs. That Switzerland's chemical industry failed to maintain the early post-war pace of export recovery seems to be largely due to the disappointing trade in perfumery and cosmetics and foreign import restrictions which did

not leave the pharmaceutical business unaffected.

The Scandinavian states have also suffered from the general foreign trade difficulties. Thus Sweden increased her chemical imports from 275,946,000 kroner in 1946 to 335,272,000 in 1947 and 180,553,000 in the first half of 1948, but her chemical exports (including substantial quantities of matches) rose hardly at all in 1947—93,259,000 kroner against 92,646,000 in 1946—and only slightly in the first half of 1948 when they amounted to 47,457,000 kroner against 44,815,000 in the corresponding period of 1947 (including 13,234,000 and 12,425,000 kroner of matches).

Declining Volume from Denmark

Denmark has imported more chemical fertilisers but smaller quantities of other chemical products, with the result that her chemical imports as a whole at 223,305,000 kroner last year and 109,197,000 kroner in the first six months of 1948 showed only an insignificant increase in value; by volume her imports have been declining. Denmark's chemical exports, on the other hand, confined to a few specialties, rose from 36,915,000 kroner in 1946 to 60,883,000 kroner in 1947 and 34,589,000 kroner in the first half of 1948 (23,178,000 kroner in January-June, 1947).

Norway's chemical exports last year rose from 112,665,000 to 148,562,000 kroner and declined in the first half of 1948 from 82,178,000 to 76,216,000 kroner. Her chemical exports increased last year from 119,279,000 to 133,611,000 kroner, but also declined in the first half of this year—from 74,946,000 to 65,289,000 kroner, mainly because of smaller shipments of fertilisers; these had already declined last year.

The foreign trade of the Scandinavian states as well as of the countries of Western Europe was overshadowed by foreign currency considerations. While chemical imports were admitted to the maximum compatible with the external payments position, chemical exports were not only limited by raw material shortages, production difficulties and other domestic troubles, but also by the inability of other European—and overseas—countries to permit chemical imports.

Reviving British Trade

British chemical exporters fared rather well in comparison with their Continental colleagues in the early post-war period, but last year Britain's chemical exports increased only slightly owing to the loss of output during the fuel crisis, and it was not until this year that British exporters have been able to make up for their disappointing business in early 1947.

Our chemical exports to European desti-

nations have shown a relative improvement, thanks largely to the temporary absence of foreign competitors. If as a result of U.S. financial aid and arrangements for an intensification of trade between OEEC countries intra-European commerce in chemical products expands, Britain's chemical industry will be well able to make a valuable contribution to the supplies needed by other European countries.

Just as before the war the adherence of the Scandinavian states to the sterling bloc had the effect of stimulating British chemical exports to Northern Europe, it should be thought that co-operation under the Marshall Aid programme will result in a similar expansion of trade. Recent statis-

tics show conclusively that lack of foreign currencies has had a marked retarding effect on trade recovery in the chemical field, especially in that sector of it which is considered to be not strictly essential. In the past the most important chemical exporting countries have also been our best markets for chemical products.

There is no reason to assume that the countries of Western and Northern Europe will in future be less willing to buy British chemicals than they were in the past. On the contrary, the changes which have taken place in Europe's chemical industry during the war and post-war period are likely to create greater opportunities on the Continent for British chemical exporters.

Registering Patents in Germany

Filing Office to Open in the U.S. Zone

A FILING office which will receive applications for grants of patents and for the registration of designs and trade marks is to be established to serve the western zones of Germany on October 1. This, the first step towards the establishment of a properly constituted patent office, will be concerned only with receiving and filing applications and will not publish patent material.

Full details of the new organisation are contained in the last issue (September 18) of the *Board of Trade Journal*, which records that the title of the new office is, the *Annahmestellen für Patent-, Gebrauchsmuster- und Warenzeichenanmeldungen*, and its address is at 102 Rheinstrasse, Darmstadt, U.S. Zone.

For the present the applications filed at Darmstadt will only have effect in the joint British and American zones.

Applications for filing from persons in the United Kingdom may be sent immediately, but all applications which are received by the filing office before its official opening date will bear the date October 1, 1948. To enable persons in the United Kingdom to take advantage of the facility of the new filing office, the Administration of Enemy Property Department announces that the Trading with the Enemy restrictions have been further relaxed and draws attention to the following Statutory Instruments which have been issued:—

Trading with the Enemy (Authorisation) (Germany) (No. 4) Order, 1948 (S.I. 1948, No. 2086). Trading with the Enemy (Transfer of Negotiable Instruments, etc.) (Germany) (No. 3) Order, 1948 (S.I. 1948, No. 2087). Trading with the Enemy (Custodian) (Amendment) (Germany) (No. 4) Order, 1948 (S.I. 1948, No. 2088).

The effect of these Orders is to permit applications for the grant of a patent or the registration of a design or trade mark in Germany and to permit subsequent dealings in respect of any such patent which may be granted, or design or trade mark which may be registered. Moneys accruing as a result of such transactions will not be subject to Board of Trade or Custodian control.

Applications to the filing office should be made preferably through a German patent agent. All arrangements for the services of such agents and for the payment of their fees must conform to the revised Instruction No. 9 of the Joint Export-Import Agency. This provides *inter alia* that contracts or agreements for the services of an agent must be in writing. The conversion rate for services will be 30 U.S. cents to the Deutsche mark. (This is equivalent to 13.43 D.m. to the £ sterling.)

The filing office will charge a fee of 10 D.m. for each application.

Copies of the orders referred to are obtainable from HMSO, Kingsway, London, W.C.2 (2d. each).

Authority was granted several months ago to the principle of enabling persons in Germany to register patents, designs and trade marks in the U.K. Detailed regulations covering this procedure will be published shortly.

Bauxite Output Up.—The production drive of the Berbice Bauxite Co., Ltd., British Guiana, has been so successful that when the m/v. *Samana* sailed in June with a shipment of 3180 tons, production had already exceeded the 1947 figures by 5000 tons, with still six months of this year to go.

BRITISH PLANT AT COPENHAGEN

Other Exhibits of Laboratory and Process Equipment

INFORMATION received this week usefully supplements that published in our last issue relating to the exhibits of chemicals and laboratory plant and equipment at the British Exhibition at Copenhagen, which opened on September 18 and continues until October 3.

W. EDWARDS AND CO. (LONDON), LTD., Kangley Bridge Road, Lower Sydenham, London, S.E.26, is exhibiting examples of the latest types of high vacuum pumps, vacuum measuring instruments and special vacuum plants.

Chemicals

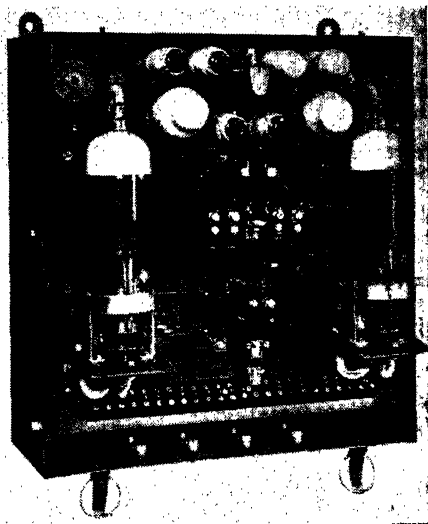
A chemical display in the Forum having an exceptionally wide appeal to industries has been provided by MAX & BAKER, LTD., whose exhibit covers the fields of pharmaceutical chemicals, laboratory, industrial, photographic, aromatic and horticultural chemicals, plastic films and medical and veterinary products. There have been many new developments, represented in the photographic section by Amfix, the ultra-rapid fixer (prints less than two minutes and negatives in 10-20 seconds) and Genachrome, the stabilised colour developer. The most interesting of the new horticultural products, Planofix, inhibits the pre-harvest drop of fruit by control of the abscission layer. In the plastics field the newest development is Ephulon, the plastic tracing medium which lends itself to many different applications.

QUICKFIT AND QUARTZ, LTD., "Triplex" Works, King's Norton, Birmingham 30, is showing a wide range of assemblies of its all-glass laboratory apparatus and of the individual components used. All the usual laboratory apparatus for organic research work is being shown, including assemblies for reaction with stirring and reflux, distillation and fractionation assemblies, water estimation and water distillation assemblies, extraction assemblies and Kjeldahl assemblies. This firm is also showing a range of pipe-line fittings and chemical plant units, including its well known coil-type heat exchangers in capacities up to 25 ft. square cooling surface area. The steam-heated boilers are being shown with fractionating columns, reflux radio heads, and vacuum receiver adapters. A feature of particular interest is the newly designed magnetically operated reflux radio head with swinging funnel. The stand also displays a complete vacuum still erected as for use. This still

has a 100-litre vessel with circulatory steam heater, 6-in. diameter helix packed column, 15 sq. ft. surface area condenser, and a vacuum fraction collecting arrangement.

REAVELL AND CO., LTD., Ranelagh Works, Ipswich, is showing, on the stand of its Danish agents, The Scandinavian Steel & Shipping Agency, a two-stage, vertical, single-acting compressor, direct coupled to a vertical, double-acting steam engine by E. Reader & Son. This set has a capacity of $2\frac{1}{2}$ cu. metres of free air per minute compressed to 25 kgs. per sq. cm. and runs at 525 r.p.m.

On the G.E.C. stand are examples of the fans manufactured by its associate company, Woods of Colchester, Ltd. These include a 60-in. propeller fan, an "Aerofoil" axial flow fan, and a man-cooler fan. The Woods 60-in. propeller fan has an air-foil type of impeller, cast in one piece from aluminium, and gives air deliveries up to 41,000 cu. ft. per minute. There is a 72-in. fan of the same design which delivers up to 60,000 cu. ft. of air per minute. These two large diameter fans are primarily intended for ventilation duties under free air-flow conditions, but they are capable of developing

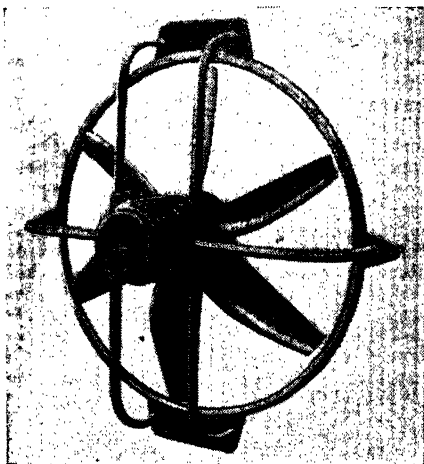


B.T.H. Thyatron motor speed control panel which regulates the speed of electric motors up to 3 h.p. output

pressures up to half-inch water gauge static pressure. Other sizes of Woods propeller fans have broad-surfaced steel blades designed for smooth and quiet air movement. Six sizes, from 12-in. to 36-in., are fitted with a patent form of resilient suspension which contributes to quiet operation.

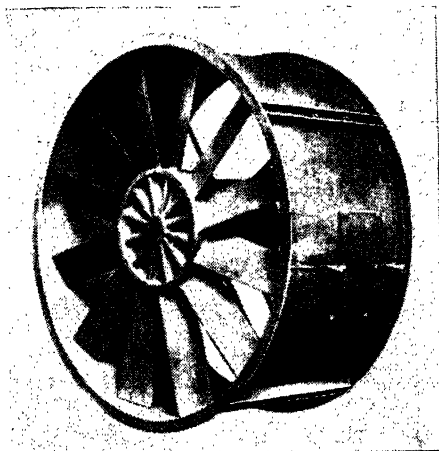
The Woods Aerofoil fan exhibited is a 30-in. axial flow fan designed for large air delivery against medium resistances to air flow. These Aerofoil fans are made in nine sizes from 6-in. to 48-in. diameter. They are non-overloading and their efficiency is in the region of 65 per cent. The Woods man-cooler fan provides a powerful, far-reaching air stream for cooling operators in hot areas. A compact Aerofoil fan, carried in a tubular steel cradle, it is lighter in weight than most other fans of this type and can be moved from place to place with little effort. There are two sizes, 15-in. and 19-in. diameter. These fans will give an air velocity of 500 ft. per minute at distances up to 30 ft. from the fan. An air velocity of 250 ft./min. will provide ample cooling in areas exposed to moderate heat, while a velocity of 500 ft./min. gives a good cooling effect to workers exposed to intense radiant heat.

A feature of the Woods fans is that the driving motors are designed specifically for fan duties and manufactured entirely in the Woods factories. They are designed to minimise the possibility of overheating due to overload.



The 60-in. propeller fan

(Photo: Woods of Colchester, Ltd.)



The Aerofoil axial flow fan

(Photo: Woods of Colchester, Ltd.)

THE MAGNETIC CLARIFIER

THE Magnetic Clarifier shown by Philips Electrical, Ltd., at the recent Machine Tool and Engineering Exhibition, Olympia, is reported to have met with a very successful reception.

The clarifier is a variation of the Philips Magnetic Filter. It consists essentially of a small restricted channel into which contaminated coolant is gravity fed, where it flows past a slowly revolving aluminium disc, driven by a small electric motor. Near its periphery this disc carries a series of powerful magnets and as these pass through the fluid they collect the ferrous sludge suspended in it and lift it out of the tank where the magnets are cleaned by wipers which sweep the sludge via a chute into the sludge-containers.

New Asthma Drug

A new substance, Neodrenal, for the treatment of bronchial asthma has been manufactured by Savory and Moore, Ltd. Neodrenal is stated to be more effective than adrenalin in relaxing artificially-induced bronchospasm; there is no rise in blood pressure and unpleasant side effects are slight. The use of this new "oral" form of adrenaline is for symptomatic relief of bronchial asthma; spastic bronchitis; a persistent asthmatic state without typical attacks, and so-called chronic bronchitis of a purely asthmatic nature. Importance in administration is that the drug should be absorbed from the mucosa of the mouth.

GROWTH OF THE PLASTICS INDUSTRY

Rapid Application of New Processes by I.C.I.

THE history of the plastics industry may be said to be reflected by the research in this connection of Imperial Chemical Industries, Ltd. The Plastics Division of I.C.I. was formed in 1936. The company's interest in plastics, however, precedes the birth of the division, but not by much. Fifteen years ago I.C.I. had no manufacture of plastics at all, although chemical research was going on in different parts of the company on certain resins and polymers which are now among the products it sells.

Perspex and Bakelite

If one leaves out natural plastics like shellac, which have been known for centuries, the history of the industry goes back for less than a hundred years, states an article in *The I.C.I. Magazine*, from which the following extracts are taken. The first product, celluloid, a mixture of nitro-cellulose and camphor, was discovered about 1860. Although it is not made by I.C.I., the company has always been interested in celluloid because of the nitro-cellulose it contains, an important product of the Nobel Division of I.C.I. This interest in nitro-cellulose and its use in the early 1930's in laminated safety glass directed attention to a new clear transparent resin called Resin M, based on methyl methacrylate, which had been made in the I.C.I. Dyestuffs Division laboratories. As sometimes happens, the uses thought so promising for a new invention were not realised; instead it became important in other ways. Resin M was a failure for safety glass and the uses expected for it then as a moulding powder were not fulfilled, but it came to make a famous name for itself in peace, as in war, as Perspex.

The second landmark in the history of plastics undoubtedly was the discovery of Bakelite, or phenol-formaldehyde moulding powder, in 1909, but this product did not really become important until after the first world war. I.C.I., between 1930 and 1932, produced at its Dyestuffs Division a product of this type, but it was unsuccessful and was withdrawn. In 1933, however, a fresh start was made when I.C.I. bought a majority shareholding in Croydon Mouldrite, Ltd., which had a small factory at Croydon. This plant had been built in 1924 by Rissik, Fraser & Co. for the manufacture of ebonite dust and the moulding of ebonite battery boxes, and some of the equipment installed then is still in use. The



"Welvic" compound for cable making passing from mixer to rolling mills

name of the company was changed to Mouldrite, Ltd., in 1934, and in 1936, with the acquisition of the rest of the shares by I.C.I., the Plastics Division was born.

While this early work was going on with Perspex and with the manufacture of phenol-formaldehyde products, chemists were working in I.C.I. and all over the world on the chemistry of polymers, from which a succession of new plastics was to emerge during the next fifteen years. At Billingham a group of chemists was working on the manufacture of a series of moulding powders and resins made from urea-formaldehyde. Work was going on elsewhere on these products, and, with the acquisition of Croydon Mouldrite, a small plant for their manufacture had been obtained, known as Kelacoma, Ltd., which was struggling along in Welwyn Garden City. With the modifications suggested by the Billingham team, the UF process was proved and an entirely new factory was therefore built nearby in 1938. This was the introduction of the I.C.I. Plastics Division to Welwyn Garden City, which in 1939-40 became its headquarters.

In the early 1930's, too, work was beginning in the company's Alkali Division on chemical reactions under very high pressure, and from this work came the discovery of another new plastic, polythene. Polythene was first made on a minute scale in

1933, but the difficulties of high-pressure work prevented serious study being made of the product and its process until 1936. From then on progress was fast, and by 1938 the difficulties of the process had been mastered and a continuous pilot plant was working. From this a full-scale plant was developed which came into operation on September 1, 1939, the day on which Hitler invaded Poland. This plant was to make an important contribution to the war.

The outbreak of war, therefore, found I.C.I. as a small but growing manufacturer of phenolic products at Croydon, urea-formaldehyde materials at Welwyn, the methacrylate products Perspex and Diakon on an I.C.I. Plastics Division site at Billingham, and polythene in Cheshire made by the company's Alkali Division. The second world war had a great effect on the division. It saw a huge growth in the demand for the thermoplastic materials Perspex and polythene, and in an entirely new group of plastics based on another polymer known as polyvinyl chloride. Perspex sheet was required in large quantities for aircraft because of its lightness, strength, resistance to weathering, ease of shaping, and clarity. Without it the RAF would have been at a serious disadvantage, for a similar material known as Plexiglas was being used by the Germans. Output was increased at Billingham, and a new factory at Darwen in Lancashire was chosen for manufacture in 1940, followed by a third factory at Rawtenstall in 1941. So great was the expansion of the Perspex demand that I.C.I. had by the end of the war a plant capacity of 6000 tons per annum, with which it can compare a production in 1938 of 155 tons and in 1936, 25 tons.

High Frequency Insulation

Polythene, too, became required in great quantities. When war broke out the product was regarded as a promising insulation for submarine cables, but the wartime development of radar created the need for an insulation capable of standing very high frequencies, and polythene filled the bill. As a result, the first plant at Wallerscote was increased to six times its original size, and a large new plant was built at Winnington, where production began at the end of 1941.

The next big wartime development was that of PVC products, which the I.C.I. Plastics Division had been studying before the war. Early in the war plasticised compounds were made from imported American PVC, but the first I.C.I. production of polymer began in 1940 in its General Chemicals Division factory at Runcorn. With the entry of Japan into the war and

the disappearance of rubber, the importance of PVC for general cable insulation was greatly increased. A large plant was erected by I.C.I. for the Government at the war chemicals site at Hillhouse, near Fleetwood in Lancashire. This plant started production in 1944. The Hillhouse plant was acquired by I.C.I. in 1946, when it decided to remain there permanently and develop the site fully.

Among the many plastics developments in the United States has been the important invention of the nylon group of polymers. The I.C.I. Plastics Division was given the job of making nylon into monofilament for brushes, surgical sutures and fishing lines, and early in 1941 a plant was started at Welwyn using nylon polymer manufactured by the I.C.I. Dyestuffs Division. The manufacture of monofil, most of which went for tooth-brushes, was regarded as of high priority throughout the war.

Increasing Production

The end of the war brought many problems to the company's Plastics Division. The older thermosetting materials, the phenolic and UF groups, had found their industrial levels before the war, and the post-war demand for them was therefore the more easily estimated. With the new materials, however, after a sharp drop in demand when war contracts were cancelled, a survey of markets at home and abroad showed the company that, far from decreasing its output, the Plastics Division should erect new plants and increase production as soon as possible.

Polythene has become a much wanted post-war material. Submarine cables have developed, as was expected before the war, although the first polythene submarine cable was laid from England to France for army communications only just after D-day. Last year the first post-war submarine telephone cable, from England to Holland, was laid which was insulated with it. Non-electrical uses have also developed in moulding powders and decorative sheet materials, and water-resistant thin films are nearly ready for offering to the market. The PVC group of products is also much in demand to-day, outside its wartime cable uses.

To-day finds the I.C.I. the largest manufacturer of plastics materials in the British Empire and among the half-dozen largest producers in the world.

For the future the I.C.I. Plastics Division has important tasks. The first is to consolidate and develop the present range of products in its new and extended factories for sale both here and in its expanding markets abroad. The second task is to develop new products for the future.

HEALTH SAFEGUARDS IN INDUSTRY

Doctors and Technicians Compare their Observations

SPEAKING, on September 17, at the closing session of the ninth International Congress on Industrial Medicine, which was opened on September 13, the Rt. Hon. Lord Webb-Johnson, K.C.V.O., C.B.E., D.S.O., T.D. (president of the Royal College of Surgeons), who presided, congratulated all concerned on the success of the congress. He said that, as a child, he had known only too well the perils of working in one industry in particular—pottery manufacture. He saw so many workers there suffering from lead poisoning, and very little was then being done about it. That was a long time ago. Later, as a student in Manchester, he had seen brought into the hospital from the mills women who had been scalped, and he had noted the cavalier way in which those, as well as the minor injuries, were treated by the medical staffs. He was pleased to say that nowadays much was done at the factory source in the way of accident prevention and improved health conditions.

Work of Pioneers

Lord Webb-Johnson referred in glowing terms to the good work done in recent times in regard to colliery diseases and accidents, such as spine injuries.

The picture which Dickens painted of conditions in industrial plants had to a large extent been changed. Those bad old circumstances had gone, very largely because of the work of the pioneers.

When the medical profession, the nursing profession, and the architect had all done their best to improve the lot of workers in industry—as they had done—it remained for the employers, and then the employees, to do their best and to co-operate for the common good. But there must not be too much dependence on science and planning by the State. There was the danger of a man being so highly directed as not to be doing the work he wanted or was most suited for. In spite of all the planning, success depended largely upon the human spirit.

There was much to be said for the value of prevention, as contrasted with the granting of convalescent leave. They (the doctors) must, for example, use their best endeavours to find a way of preventing such things as tumours of the bladder associated with work in the manufacture of certain chemicals, and the complaints arising from working in close proximity to radioactive substances. Above all, they wanted leadership in these matters, and they had the most wonderful material in the world on which to draw.

Sir Ewart Smith, M.A., M.I.Mech.E. (member of the Advisory Council on Scientific Policy), spoke on "The Contribution of Engineering to Industrial Health." He said engineering in relation to industry was particularly important because on it depended essentially the conception of the lay-out of industrial plants. It catered largely for the needs of the human beings who had to operate the machinery and plant in the factories, and therefore had an important bearing on the health and happiness of those workers.

He made a plea for the designers of machinery not to be forgotten when they were thinking about industrial health and the prevention of accidents in factories. The designer should be brought in at the earliest stage. It would be seen, then, that the engineer had to play a very important part in psychological as well as physical health in industry.

As regards plant lay-out, said Sir Ewart Smith, they had to design so that there was a proper flow of materials to ensure efficient and economical working, with sufficient spacing of the machinery and workpeople, so that the latter had adequate and suitable light and air space. The engineer should co-operate with the architect, and should not regard the latter merely as the one who put on the frills at the later stages. Then the engineer was concerned with the lessening of human effort, with effecting the change from manual to automatic effort.

Conserving Human Energy

Also coming within the scope of the engineer, went on Sir Ewart Smith, heating and ventilation were of growing importance in regard to the conserving of the energy of the worker as well as from the actual health point of view. And they must not lose sight of the importance of avoiding dust and noxious gases and fumes in industry. Science, if properly applied, could nowadays find the answer to all these things. Noise and vibration also came within the purview of the engineer. Here, again, science had provided ways and means of removing such objectionable conditions.

The engineer is vitally concerned with matters of safety in industry, went on Sir Ewart Smith, and the use of codified knowledge was of great importance in this. But merely to give canteens and other amenities to the workers did not achieve this. One had to get behind the picture and to find what the workers were thinking. He, per-

sonally, believed that the psychological side was much more important than the material aspect, and he felt that these things depended largely on leadership and management.

Incentives played an important part. He believed that they should try to work out some incentive on the team basis, and he thought they should provide interests for the workpeople in their leisure hours. Improving conditions in industry was a joint business. In that way, each man was more likely to take a pride in his job, and they would then get that leadership which this country needs and deserves.

The following are synopses of some of the papers of chemical interest which were read during the congress, the full texts of which will be published later by the Medical Research Council:—

Dr. Hubert Wyers (Great Britain):

"Some Recent Observations on Hazards in the Chemical Industry."

Atebrin. One of the newer anti-malarials. Workers exposed to the dust complained of seeing blue haloes around lights. The cause was a diffraction effect consequent on the deposition of intracellular granules of an insoluble derivative of atebirin in the corneal epithelium.

Sulphur. Female workers exposed to the dust of sublimed sulphur developed a disfiguring folliculitis of the face without any signs of contact dermatitis.

Vanadium. The pentoxide may produce systemic effects (pallor, dyspnoea, palpitation, tremor), local effects on the tongue (greenish-black discoloration) and reticular shadows on the chest skiagram. Four laboratory workers engaged on fusing vanadium oxides all developed pneumonia.

Silver. Argyria, once common as a side-effect of chemotherapy, is now rare. It occurred in a chemical process worker fingers were repeatedly contaminated by a solution of silver nitrate as he poured it from one test tube to another.

Metol. This substance is generally associated with "photographers' itch." When it is inhaled in large quantities it causes systemic poisoning. The molecule contains phenyl and amino groups and their characteristic symptoms of black urine (carboluria) and cyanosis (methaemoglobinaemia) may be found present together. The interpalpebral fissure may be stained a yellowish brown.

Dr. P. Pachner (Czechoslovakia):—

"Lead Poisoning at Blast Furnaces."

Lead poisoning of moulders working at blast furnaces is not unknown but is very seldom described, so insufficient attention is paid to it. Working at blast furnaces is now, in the time of good hygienic pro-

visions in most industrial sectors, one of the rare, but nevertheless serious risks of injury due to lead.

The author gives an account of some typical cases of chronic lead poisoning of moulders at the blast furnaces, accompanied with typical clinical symptoms and laboratory findings, arising from the use of iron ores with high content of lead. The rule of removing lead accumulated in the blast furnaces has not been observed.

The result of removing the technical faults and regularly discharging the lead from the bottom of the furnace has been that not a single case of lead poisoning has been seen despite the fact that the raw materials have remained unchanged.

Averting Radioactivity Risks

Dr. Hermann Lisco (U.S.A.):—

"The Potential Hazards and Pathological Aspects of Radioactive Isotopes."

Recent advances in nuclear physics have already commenced to have a considerable impact on biological and medical research by providing new tools for investigation. More and more use will be made in the future of radiant energy in private research laboratories, Government agencies and in industry in the peace-time developments of atomic energy. This poses new and often perplexing problems to the public health officer and to the physicians engaged in the practice of preventive medicine.

The literature is replete with human case records and with experimental data, which demonstrate the harmful effects of ionising radiations if no proper precautions are taken in the course of such work.

In this paper is discussed recent experimental work in which the acute, subacute and chronic pathological effects of radioactive isotopes have been studied. These studies have been primarily concerned with radioactive materials released in the fissions of uranium and plutonium. Preliminary results with p^{32} are also discussed.

Dr. A. E. Nyström (Sweden):—

"Health Hazards in the Chloroprene rubber Industry."

The production of synthetic rubber in Sweden is carried on mainly by chloroprene synthesis. During the period 1944-48 the state of health of the workers in this industry has been followed. Symptoms manifested themselves almost solely among those exposed to chloroprene. About 80 per cent of them were affected with intense pain in the chest after even mild physical exertion. Others complained of palpitation, dyspnoea and giddiness. As many as 90 per cent of the workmen employed in the polymerisa-

A NEW MASS SPECTROMETER

Aid to Study of Negative Atomic Ions

(From Our New York Correspondent)

DR. WILLARD H. BENNETT, of the U.S. National Bureau of Standards, investigating conditions for the formation of negative atomic ions of the heavier metallic element, has succeeded in developing a vacuum tube specially designed to

spectrometer not only opens up a new means of exploring the little-known fundamentals of negative atomic ions, but its special characteristics make it widely applicable for other uses, including the mass spectrometry of positive ions.

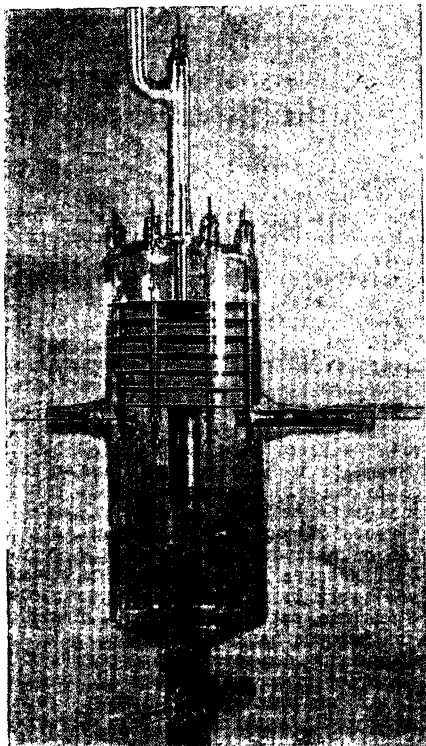
Experiments begun at the National Bureau of Standards by Dr. Bennett in 1946 indicated that negative atomic ions might well exist in the many familiar forms of electrical discharge in vacuum tubes, but that they would not be detected if the distance through the tube between the discharge and the electrode was large. It was necessary to devise an experimental method, incorporated in the new spectrometer, for separating and identifying such ions within distances of only a few centimeters.

Study of Positive Ions

In its more advanced form, this two-stage spectrometer may be used for positive ions as well as negative ions. The equipment consists of a multigrid tube in which an adjustable radio-frequency is applied to two grids, while all other electrodes are held at the proper direct-current potentials, and the ion current is measured at the plate. The more exacting requirements of negative-ion separation require the use of a small magnetic field produced with coils, but if positive ions are being separated, no magnetic field is needed.

One of the principal limitations upon the resolution possible with the ordinary mass spectrometers using magnetic deflection of beams has been the spread in energies of the ions at the ion source. The percentage spread occasioned by this factor can be reduced by increasing the voltage applied to the ions before they are magnetically resolved. The extent to which this can be done is limited however, by the magnetic field that can be obtained in a space sufficient to contain the tube.

In the radio-frequency mass spectrometer, the bureau states, this difficulty is eliminated and the voltage of the ions can easily be raised to any value for which insulation can be provided. The frequencies required are then increased by an amount equal to the square root of the factor by which the voltage is increased. Raising the voltage from 100 to 10,000 volts, for example, increases the frequencies ten-fold, and reduces the percentage spread of mass line,



One of the new tubes for the study of negative atomic ions

provide a greatly simplified and flexible radio-frequency mass spectrometer for detecting, separating, identifying, and measuring such ions.

Since negative atomic ions, consisting of atoms with extra electrons, have very low energies of formation, their study hitherto has been very difficult, because of the rapid dissociation of the ions in very short distances of travel; i.e., before they can reach a measuring electrode. The new

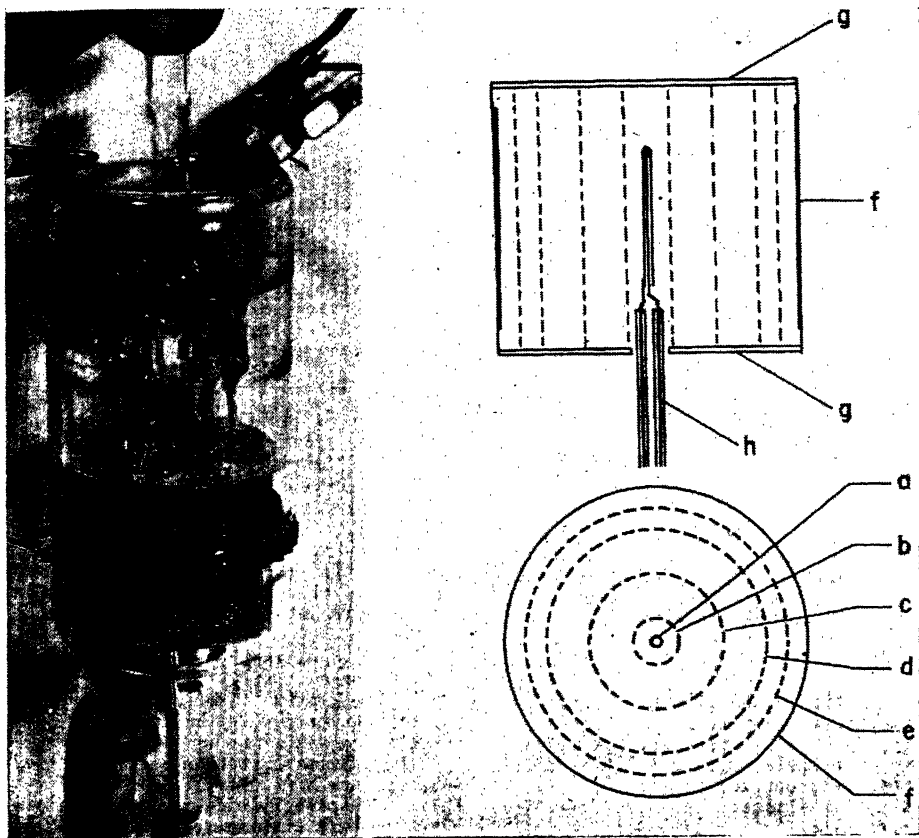
due to velocity spread in the ion sources, by a factor of 1/1000.

The first successful radio-frequency mass spectrometer, a single-stage six-electrode tube, consists of a cathode about which are arranged four co-axial cylindrical grids and an ion-collecting plate. Helmholtz coils surrounding the tube provide a 100-gauss magnetic field in a direction parallel with the axis of the tube. Such a field is required in negative-ion work to confine the electrons to the space inside the first grid and to avoid the formation of positive ions in parts of the tube where neutralisation of the negative ions may occur before they reach the detecting electrode.

In the operation of the single-stage

negative-ion spectrometer tube, ions arising at the cathode are accelerated through the first grid at a velocity corresponding to the DC potential of that grid (say 15 volts). They are further accelerated by the field due to the potential on the second grid which is an alternating radio-frequency (say 5 volts) plus a DC potential (reduced to 10 volts). The third grid is held at a DC potential (reduced to 5 volts).

Those ions which pass the first grid at the proper phase of the RF field, and which have such mass and related velocity to pass through the second grid while the RF potential changes phase, receive an additional acceleration due to the RF field while travelling to the third grid. It was found



Two presentations of the single-stage, six-electrode mass spectrometer, of which the diagram on the right shows the assembly of the cathode (a), the four co-axial cylinder grids (b, c, d, e) and the ion-collecting plate (f). Mica discs (g, g) close the electrodes, excepting the orifice where the glass-insulated cathode lead (h) extends. By surrounding the tube with Helmholtz coils a magnetic field is formed for negative ion study

experimentally, verifying theoretical calculation, that ions passing the first grid at $45^\circ 27.5'$ of phase angle of the alternating current on the second grid, and having just the right mass (and corresponding velocity) to pass the second grid at 180° of phase angle of the current on that grid, will pass each of the first three grids with the same velocity (corresponding to 15 volts), although the DC potentials on those grids are successively reduced. This is caused by the ion picking up energy from the field of the alternating current on the second grid since the change in phase occurs as the ion passes through this grid.

A blocking potential difference, nearly equal to the maximum energy which an ion with the proper mass (corresponding to the frequency) could pick up from the alternating current, is applied between the cathode and the fourth grid. The blocking potential may be, for example, 9.6 volts negative with respect to the cathode. The collecting electrode, or ion-collection plate, is held at 40 volts positive with respect to the cathode to insure that no positive ions will reach the anode. An electrometer tube circuit and galvanometer are used for measuring the selected ion currents to the anode.

By observing the negative atomic ions produced at an oxide-coated cathode in a water-vapour atmosphere at less than 10^{-6} mm. of mercury pressure, typical mass-resolution data may be obtained for plotting resolution curves. The data is taken while

holding all potentials constant and varying only the applied radio frequency. For example, an AC potential of 5 volts may be used while DC potentials of less than 100 volts are applied to the other electrodes. The required frequency range extends from 3300 kc. for a mass value of $\frac{1}{2}$, to 104 kc. for mass value 250. This range of readily producible radio frequencies more than covers the full mass range of all elements.

By extending the method to two stages in a nine-electrode tube, either with cylindrical or parallel-plane electrodes, and applying the radio frequency to two of the grids, a higher order of mass resolution is obtained. Such a large number of grids would not be practical in a tube if the usual woven-wire screens were used. There is available now, however, a knitted wire fabric which has more than 95 per cent open area and with which this kind of tube can readily be constructed.

This apparatus may be used in the mass spectrometry of positive ions and in ionisation studies, as well as in the present negative-ion investigations.

The simplicity and low cost of the radio-frequency mass spectrometer, the bureau holds, should make it attractive not only in those applications in which its special characteristics make it superior to other kinds of mass spectrometer, but also in those laboratories where the expense of other types of equipment is prohibitive.

HEALTH SAFEGUARDS IN INDUSTRY

(Continued from page 419)

tion department were affected with alopecia.

Effect on Animals

Experimental tests with chloroprene made on animals showed a high toxic effect, with functional disturbances in the liver, kidneys and organs of circulation, as well as changes in the coagulation conditions of the blood. The generally negative findings on medical examination of the workers are, therefore, remarkable.

According as hygienic improvements of various kinds were carried out in the factories and the attention of the workers awakened to the existing risks, practically all the symptoms disappeared.

Dr. Poul Bonnevie and Dr. Aage Grut (Denmark):—

"The Hazards of Acute and Chronic Carbon Monoxide Poisoning in Industry."

In the blood of workers in foundries the carbon monoxide haemoglobin percentage proved to be 7-20 after a working day, 90 per cent of them showing acute symptoms on the moulding day, while only slight

symptoms of chronic carbon monoxide intoxication occurred, the exposure being too short and infrequent.

In gasworks a few acute and chronic cases were found, exposure occurring only in old-fashioned, defective working procedures. After moderate exposure to gas—8 hours daily—8 out of 15 female workers showed symptoms of chronic intoxication which disappeared after improving ventilation.

Forty-two per cent of chauffeurs driving producer gas cars had shown symptoms of acute intoxication. The occurrence of chronic intoxication was not greater among heavy tobacco smokers, nor did it increase with the number of working years. With an increasing rate of acute CO intoxication there was an increase in the occurrence of chronic intoxication, but 32 per cent of those with symptoms of the chronic form never had any symptoms of acute intoxication.

The conclusion must be that chronic carbon monoxide intoxication develops only where the exposure is of such frequency and to such concentration that acute intoxication is not set up.

NEW SOURCE OF INDUSTRIAL ALCOHOL

Shell Refinery's Addition to U.S. Supplies

A LARGE addition to American supplies of ethyl alcohol from petroleum refinery processes instead of the commoner fermentation method was due to start this month at the Shell Chemical Corporation's new plant at Houston, Texas. Of this \$12 million plant *Chemical and Engineering News* reports that its planned output will be about 18 million gall. annually, the equivalent of some 6 per cent of total production of ethyl alcohol. The development by Shell of a satisfactory method of deriving this product from petroleum products is expected to have a profound effect in future years on the entire alcohol industry.

The basic raw material for the Shell process, says *Chemical and Engineering News*, is ethylene, which is obtained with other olefins in the stream of gases from the great catalytic oil cracking plant at the adjoining refinery of the Shell Oil Co. After careful separation and purification the ethylene is converted by direct hydration into ethyl alcohol.

Varied Products

The new plant was started in early 1947, with other important units in Shell Chemical's multimillion dollar expansion in Houston. Most of these units have now been completed and the Deer Park plant is producing such items as methyl ethyl and methyl isobutyl ketones, sec-butyl alcohol, allyl alcohol, and various chlorohydrins and derivatives. An additional important unit, that for the manufacture of synthetic glycerol, is expected to go on stream in the near future.

The new alcohol unit will be operated under strict governmental supervision. Although none of the product will be used in the manufacture of alcoholic liquors,

some idea of the plant's size may be gained from the fact that it is estimated that to produce a similar quantity of alcohol by fermentation processes would require 45 million bushels of grain.

Many Uses

Under the trade-name Neosol, Shell will offer the ethyl alcohol as a proprietary solvent. It will also be available in government-approved standard specially de-natured grades. Among its very wide industrial applications are those of formulation of lacquers and varnishes, manufacture of anti-freeze, processing of foods and vitamins, extraction of drugs, dyestuff synthesis, and plastics, rayon and cosmetics manufacture.

Utilising the same basic raw material, ethylene, but aimed in an entirely different direction, is a second plant unit announced for Deer Park, also to begin commercial-scale production in September. This unit will manufacture ethyl chloride, at present used as a chemical intermediate in the manufacture of plastics.

This development at Houston, writes our New York correspondent, represents the fruition of a policy long pursued by the Shell interests to found a new industry based on allyl compounds derived from petroleum hydrocarbons. The units at Houston will yield allyl chloride, allyl alcohol, glycerol epichlorohydrin, glycerol dichlorohydrin, diallyl phthalate, diallyl ether, acrolein, ethyl, isopropyl, and secondary butyl alcohols, acetone, methyl ethyl ketone, and ethyl, propyl and propylene chlorides. The whole project, involving an investment of upwards of \$45 million has been based on processes originating from Shell Development's research.

Another Phthalic Alkyd Resin

A NEW phthalic alkyd resin, known as Aroplaz 1248-M, which does not haze in the presence of zinc oxide and permits mirror-like finishes and retains its gloss, was introduced last week by U.S. Industrial Chemical, Inc., New York City. A pure, long-oil, oxidising alkyd, supplied as 70 per cent solids in mineral spirits, the product is applicable for formulation of architectural paints and enamels, especially for use in mill whites for textile mills, and for all maintenance finishes. The company claims that, up to the present, alkyds have tended to develop a surface haze giving the

appearance of a thin film of chalk, which was particularly pronounced when zinc oxide was used in pigmentation. As zinc oxide is essential to prevent yellowing of white enamels, hazing has been a serious drawback to the use of alkyds in such enamels.

Specifications to which Aroplaz 1248-M conforms are as follows: non-volatile, 69-71 per cent; solvent, mineral spirits; viscosity, Z-Z2 (22.7-36.2 poises); acid number of non-volatile, 8-12; colour (Gardner Standards, 1933), 7-9; weight per gallon at 25°C. (solution), 8.05-8.15 lb.

American Chemical Notebook

From Our New York Correspondent

OFFICIAL inventories, listing and describing the general-purpose equipment for peace-time production of 100 war and industrial plants declared available for reparations from Germany, have been received by the Office of International Trade, U.S. Department of Commerce. While these plants have been declared available for reparations, they have not as yet been allocated by the Allied Control Authority. The inventories indicate that the plants are suitable for the production of a wide variety of merchandise including metallurgical products, activated carbon, acetone from acetic acid, plastics and chemicals, pumps and compressors, and equipment for the production of liquid oxygen and bottled industrial oxygen.

* * *

The Du Pont Company announces that it has submitted 4260 patents, about two-thirds of the patents the company owns, to the U.S. Patent Office for listing in the Patent Register as available for licensing. The first official list of Du Pont patents is expected to appear in an early issue of the Patent Office Gazette. The company states that study of its patents will be continued to determine what additional listings may be made from time to time, and patents not included in the present registration are not necessarily withheld from consideration for licensing. The present list was compiled only from patents granted since January 1, 1933, as those with only a short remaining life were not considered. The life of a patent is 17 years.

* * *

First steps towards increasing the U.S. titanium supply have been taken by the Kennecott Copper Company and the New Jersey Zinc Company which are to construct a \$20,000-\$25,000 titanium smelter at Sorel, Quebec. Initial contracts have been made for power with the Shawinigan Water and Power Co. Construction of the plant is to start almost at once and ultimately the plant will ship up to \$10 million worth of titanium slag annually to the United States. The research department of the water and power company played an important rôle in the development of a process by which the titanium slag will be economically separated from the iron ore. Prior to the war, high quality titanium-bearing ores were readily available from the State of Travancore in India, but regu-

lations recently imposed on exports have made it necessary for users of titanium to look for other sources of supply. The titanium content of the Quebec ore was intimately mixed with iron ore, and until the new process was developed separation of the two to produce a titanium slag of sufficiently high quality for the manufacture of titanium dioxide was an extremely difficult task.

* * *

The manufacture of Lactoprene EV, the modified polyacrylic ester experimental product developed by the Eastern Research Laboratories of the U.S. Department of Agriculture, has now been developed on pilot plant scale by the B. F. Goodrich Chemical Company, Cleveland, Ohio. To be redesignated as Polyacrylic Ester EV, it will complement other nitrile and polyacrylic ester type rubbers now being manufactured by the Goodrich Company.

* * *

The New York Office of (Supreme Command Allied Powers) Foreign Trade, has announced that more than 300,000 metric tons of unassorted, semi-finished and finished alloy steel and alloy scrap, of which about half is owned by agencies of the Japanese Government and the remainder in the hands of private owners, will soon be made available in Japan for export sale. Scrap owned by Japanese Government agencies will be sold by the Japanese Board of Trade on a sealed-bid basis, and stocks will be disposed of through private buyer-seller negotiations under procedures applicable to established floor prices. These contracts, to be approved by the Board of Trade and validated by SCAP, became effective last week.

* * *

The American Iron and Steel Institute has now announced that deliveries of all finished steel products in the first seven months of 1948 were more than 1.3 million tons greater than in the corresponding period last year. The institute said that shipments of cold-rolled sheets set a monthly record of 583,417 tons in July, raising this product's total for the first seven months of the year to 3,868,500 tons, or 23 per cent more than the shipments in the same period of 1947, when a peacetime record was established. Total shipments of steel products in July amounted to 5,229,880 tons or 5.1 per cent more than the figure for July, 1947.

Technical News and Services

THE 80th edition of the "Chemical Manufacturers' Directory," newly issued, helps to supply a need to which the frequency of requests received by THE CHEMICAL AGE for information relating to supplies of various chemicals bears witness. The editor of this reference book makes no claim to have embraced the whole increasing multiplicity of chemical products, but the data he presents in the 199 pages of editorial and advertising text should answer many of the problems with which all users are confronted from time to time. The information comprises principally a list of chemicals alphabetically arranged, with appropriate cross-references (52 pp.) and similar arrangements of names, products and postal, rail and telegraphic information about chemical manufacturers in England and Wales (102 pp.), in Scotland (13 pp.) and in Eire and Northern Ireland (2 pp.). Two pages are devoted to chemical brokers and agents in London. (Price 6s., post paid, from 21 City Road, London, E.C.1.)

* * *

To fill the increasing demand for carrying out filtration tests on a pilot scale under plant conditions, prior to actual plant scale purchase, one New York engineering firm—the Niagara Filter Corpora-

tion, has inaugurated a new service which facilitates pilot plant operations through rental of pilot plant filter equipment. Constructed as exact small-scale models of the firm's production size vertical pressure-leaf filters, which may have up to 500 sq. ft. of filter area, the pilot filters themselves have up to 12 sq. ft. of area and are constructed entirely of type 316 stainless steel. The small-scale appliances are available with or without steam jackets and cake removal door.

* * *

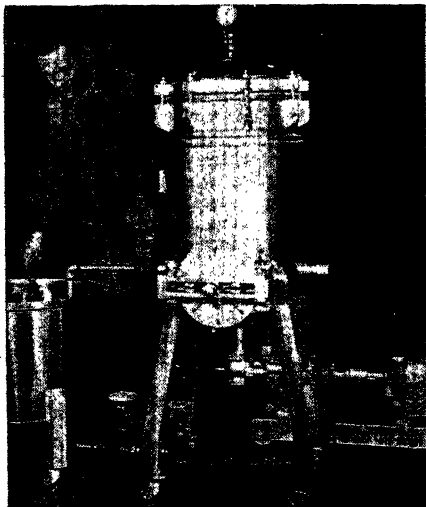
The 1948-49 edition of "The Fire Protection and Accident Prevention Year Book" (Benn Brothers, Ltd., at 10s. 6d. post paid) is now ready. The edition is limited by paper rationing, and early application for copies is advisable. The book contains a complete directory of makers and suppliers of fire protection and factory safety equipment, in addition to particulars of the new County and County Borough Fire Brigades, their principal officers and their equipment. In addition, it embodies a wealth of technical matter of value to the industrialist in preventing fire or solving works fire and accident problems.

* * *

The production of thermostatic bimetal is described in one of three reports on bimetal manufacture published by the Office of Technical Services, Department of Commerce, Washington. Two other reports discuss the production of bimetallic strip and bimetal tubing. They give information on German methods and equipment used for bonding, rolling, annealing and pickling. Specifications of component metals used and of bimetals produced are included. The reports describe all operations and contain several appendices which present coefficients of expansion and other properties of the standard German bimetals.

* * *

A wide range of split type bushes for automatics have now become available from Protolite, Ltd., and are recommended in cases where steel bushes frequently have to be replaced on account of wear. All Protolite bushes are fitted with the company's cemented tungsten carbide which has high wear-resisting properties.



The pilot-scale pressure leaf filter

Home News Items

Limited Mails to Palestine.—Air and surface mail services from this country to Palestine have been extended to certain places in Arab-controlled areas of which the following are the more important: Beersheba, Bethlehem, El Faluja, Gaza, Jenin, Nablus, Ramallah and Tulkarm.

Carbon Black.—Notice has been given of a change in the name of The Palatine Development Co., Ltd., to Philblack, Ltd. The company has obtained from The Phillips Petroleum Co., of Oklahoma, U.S.A., the rights to manufacture two types of carbon black in this country. (THE CHEMICAL AGE, August 21.)

Self-Cleaning Paint.—Technicians at the British Railway paint laboratory at Derby, have invented a new self-cleaning white paint for use on equipment required to be seen clearly. The process known as "controlled chalking" consists of the slaking off of the old coat of paint leaving a new one below. Similar paint in other colours can be produced, but the actual colours and intervals at which the layers slake off are secret.

Overall Wage Increases.—In the House of Commons last week Mr. Isaacs, Minister of Labour, informed Mr. Boyd-Carpenter that increases in rates of wages reported to his department as taking effect between the beginning of February and the end of August, 1948, affected nearly 4.5 million workpeople and resulted in an aggregate increase of £1 million a week. He was unable to say how many increases had taken place.

Overseas Gifts.—While the exact figures of incoming gift parcels are not available, a statement from the Post Office says it is estimated that during last year upwards of 14 million parcels were received in the civil mails from abroad, and about 85 per cent of these were gift food parcels. The principal donors were the U.S.A. (over 3½ million) and Australia (over 3¼ million parcels). This is exclusive of schemes under which food is sent to this country in bulk shipments.

Education in Fuel Technology.—A two-year post-graduate course in chemical engineering leading to the degree of Master of Science in Chemical Engineering at Durham University is being offered from next month at King's College, Newcastle-upon-Tyne. The course will be available to graduates in Mechanical Engineering or those possessing some equivalent degree or qualification. Opportunity has been taken of linking chemical engineering with the teaching of fuel technology.

New Cellulose Paint Plant.—Construction of a new factory for the manufacture of cellulose paints at Seaward Street, Glasgow, has been approved by Glasgow Corporation Sub-Committee. The sponsors are A. H. Robinson & Sons, paint factors, of Golspie Street, Govan, Glasgow.

Dyeworks Strike.—Some 300 men and women went on strike at a Bradford dyeworks on September 15, following a dispute with their employers, Edward Ripley and Son, Ltd., over the engagement of one man. A representative of the firm described the strike as "unofficial" and "a domestic matter."

Coal Output Below Target.—Last week's coal output was up by some 26,000 tons on the previous week, mainly on account of an improvement in deep-mined coal, although about 17,000 more tons were lost through recognised holidays. The total of 4,053,000 tons is still considerably below the weekly figure needed to reach the year's target.

Disposal of Chemical Ammunition.—The last load of chemical warfare ammunition to be disposed of under arrangements made by the Ministry of Transport, was carried by the *Miervaldis* when she sailed from Barry to be scuttled in the Bay of Biscay. She was the seventeenth ship used for this purpose, and her load of 1880 tons brought the total disposed of in this manner to nearly 100,000 tons.

I.C.I. Works Closing.—Notices were posted last week at the Holme works of the I.C.I., Ltd., plastics division at Rawtenstall informing the 200 employees that the works will close on November 14. Offers have been made to the employees, 57 of whom are staff workers, of alternative work with the firm at its other works in Lancashire. The directors state that the decision to close the Rawtenstall works has been made to ensure "increased efficiency" in production.

Czechs to Aid Export Drive.—Specialised technology related to the manufacture of translucent hard-glaze china will be employed in this country by two former Czech industrialists (now naturalised British subjects), Mr. J. C. Bryan and Mr. J. Ehrlich. They will be joint managing directors of a new factory at Hebburn-on-Tyne which is being built by the Board of Trade with Treasury assistance. The factory will employ 345 at first, but that figure is expected to be doubled within five years. Production should begin in May next year.

PERSONAL

LT.-GEN. SIR W. G. LINDSELL, G.B.E., L.K.C.B., D.S.O., M.C., who has been a director of Petrochemicals, Ltd., for the past two years, has been elected chairman of the board in place of Mr. H. Stuart Ebben. Mr. Ebben has been chairman of Manchester Oil Refinery, Ltd., since its inception in 1938 and retains his seat on the board of Petrochemicals, Ltd. General Lindsell, who is 64,



Lt.-Gen. Sir W. G. Lindsell

after his retirement from the Army in 1945 was appointed chairman of the Disposals Board, being responsible for organising the disposal of £10,000,000 worth of Government surplus stores for the Board of Trade. He joined the boards of Manchester Oil Refinery, Ltd., Petrocarbon, Ltd., and Petrochemicals, Ltd., in 1946.

MR. THOMAS F. LAURIE, who was entrusted with the formation of the Irish-American Oil Co., in 1922, will be taking up a new position as chairman of the company at the end of the year. This will prove a popular appointment in Dublin where he has held many public offices, including the presidency of the Dublin Chamber of Commerce. He was appointed a general sales manager of the Anglo-American Oil Company in London in 1938, and later moved on to the International Association (Petroleum Industry), Ltd. On the outbreak of war he was seconded to the Petroleum Board, where he served as general sales manager. He is a Fellow of the Institute of Petroleum and a member of the council.

PROF. DOUGLAS McCANDLISH, head of the Leather Industries department, Leeds University, was elected the first honorary life member of the Society of Leather Trades' Chemists at their annual meeting, in recognition of his services in the advancement of leather science. In 1919 he was appointed to his present position in the university at which he had graduated with honours. The professor has also held industrial posts in Leeds and was chief chemist to A. F. Gallum and Sons, of Milwaukee, one of the largest tanning firms in the U.S.A. He was appointed president in 1925 of the Society of Leather Trades' Chemists and occupied the office for two years.

SIR FRANCIS EVANS, British Consul General for New York City, has decorated DR. O. S. DUFFENDACK, of White Plains, New York, with the ribbon of the King's Medal for Service in the Cause of Freedom for valuable services rendered to the Allied war effort in various fields of scientific research and development. The insignia itself is to be presented at a later date. Dr. Duffendack was, until 1944, Professor of Physics at the University of Michigan, where he directed research activities for 16 years. He is now president, vice-chairman of the board and director of research for Philips Laboratories, Inc., at Irvington-on-Hudson, New York, and a director of North American Philips Company, Inc., of New York.

MR. MEREDITH GWYNNE EVANS, D.Sc. (Manchester), F.R.S., at present professor of inorganic and physical chemistry in the University of Leeds, has been appointed to the Chair of Physical Chemistry at Manchester University in succession to Professor Michael Polanyi. Professor Evans, who will take up his duties in Manchester in January, 1949, has published a large number of papers on kinetics and the mechanism of chemical reactions, and has built up a large and active research school in Leeds.

MR. W. T. COOPER has been appointed assistant secretary (editorial) of the Institute of Fuel. He was at one time physics master at Tettenhall College, Staffordshire, and later on joined the staff of the Institution of Electrical Engineers, of whose journal he became assistant editor. For the past five years. Mr. Cooper has been scientific editor and head of the publications department for the British Coal Utilisation Research Association at Leatherhead.

(Continued overleaf)

Radioactivity and Engineering Discussions

Changing Conditions of Inorganic Chemistry

PROFESSOR H. J. EMELEUS will discuss "The Impact of Radioactivity on Inorganic Chemistry" in his three lectures at the Royal Institution (the eighth post-graduate series organised by the London section of the Oil & Colour Chemists' Association) at 6.30 p.m. on Thursdays, September 30, October 7 and 14. The chemistry of radioactive substances will be discussed in the first lecture, including those that occur naturally and those that are products of atomic fission. The experimental study of radioactive substances will be described in the second lecture, including the newer techniques, and health safeguards. The third lecture will be devoted to applications of radioactive substances, and will include a general survey of available "tracers" and the techniques of using them in tackling chemical problems. Admission will be by ticket only (10s. for the course), from Mr. H. C. Wordsall, hon. secretary, London section, O.C.C.A., c/o Plastanol, Ltd., Crabtree Manorway, Belvedere, Kent.

The Atomic Age

A series of six lectures by well-known speakers on "The Atomic Age" will be given on Tuesdays at 6 p.m. commencing October 26, at the Memorial Hall, Farringdon Street, E.C.4. The first speaker will be Prof. M. I. Oliphant, who will be followed by Prof. P. M. S. Blackett (Nov. 2); Prof. R. F. Harrod (Nov. 9); Lord Russell (Nov. 23); Mr. Lionel Curtis (Nov.

30) and Prof. D. Brogan (Dec. 7). The lectures are given under the auspices of the Sir Halley Stewart Trust and free reserved seats may be obtained on application to the secretary.

Plant Engineers' Conference

At the first annual conference of the Institution of Incorporated Plant Engineers, to be held at Cheltenham Spa on October 7, 8 and 9, in addition to technical discussions, there are to be speeches by leading industrial personalities. The principal speaker will be Sir Percy Mills, K.B.E., who will address the conference on the subject of "The Enlightenment of Industrial Management." Sir Percy is managing director of W. & T. Avery, Ltd., and vice-president of the Midland Advisory Council on Industrial Productivity. Other speakers will be Dr. E. S. Grumell, C.B.E., chairman of the Fuel Efficiency Committee of the Ministry of Fuel and Power; Major Egbert Cadbury, joint managing director of Cadbury Bros., Ltd., Bourneville, and J. S. Fry & Sons, Ltd., Somerdale, Bristol, director of Lloyds Bank, Ltd., and regional controller, Ministry of Fuel and Power South Western Region; and Mr. C. Lacy-Hulbert, production director of Tube Investments, Ltd. The chairman of the conference will be Mr. L. G. Northcroft, joint managing director of Spirax Manufacturing Co., Ltd., and Sarco Thermostats, Ltd., Cheltenham.

PERSONAL

(Continued from previous page)

MR. M. C. MACNULTY has joined the staff of Bamag, Ltd., chemical engineers, as head of their drying department. Problems connected with the drying of farm crops are one of Mr. MacNulty's special fields of experience.

Several distinguished British scientists were among those who assembled in Stockholm this week as guests of the Royal Swedish Academy of Science to commemorate the death just 100 years ago of Jöns Jakob Berzelius. They included SIR HAROLD HARTLEY, who addressed the academy on Wednesday, SIR IAN HEILBRON, who was a speaker at the memorial banquet on the previous evening, PROF. PHILIP BOWDEN and DR. KATHLEEN LONSDALE.

Obituary

MR. STANDLEY BELCHER, whose death is announced, was co-founder and managing director of the Birmingham firm of Standley & Belcher & Mason, Ltd., scientific apparatus manufacturers and laboratory furnishers. He was well known throughout the chemical trades, having been associated with this interest for over half a century. He was instrumental in the development of scientific glassware in this country from the outbreak of hostilities in 1914, when he realised that essential war production could not be carried on without replacing supplies which, up to that time, had been regarded as principally a German monopoly. As a founder member of the British Laboratory Ware Association, Mr. Belcher's advice was often sought and regarded as invaluable by the trade and by the many distinguished medical and scientific people, by whom his loss is deplored.

Overseas News Items

Big S. African Fertiliser Project.—A factory covering 60 acres in the Transvaal to produce fertilisers by distillation of low-grade coal and nitrogen synthesis, is to be established early next year, states a Reuter message from South Africa, which estimates the constructional costs at about £4 million. The equipment, it is stated, will be provided by the European Chemigas organisation.

Uranium Miners in Saxony.—Bad working conditions, neglect of safety precautions and severe supervision by Russian overseers are reported to be the cause of increasing numbers of workers leaving the uranium mines in Saxony. The authorities have tightened up the regulations for travel into and out of the area which includes the Erzgebirge mining district.

Italian Overseas Trade.—Records of Italian imports and exports in the first half of this year indicate that the largest purchases by Italy of chemical and associated materials included cellulose (for textiles) 21,807 tons, mineral phosphates 349,243 tons, crude sodium nitrate 18,678 tons, solid bitumen and residues 5906 tons, and tar oils and derivatives 18,040 tons. Among the larger export items were zinc ore 1448 tons, mercury 405 tons and sulphur 70,955 tons.

Australian Sulphur-Extraction Scheme.—Mr. J. B. Chifley, Australian Prime Minister, has announced that a proposal for a sulphur-extraction scheme at Mount Morgan's gold and copper mine, Queensland, which the promoters claim would save \$4,000,000 annually, has been referred to the Mineral Resources Survey Department for examination. A Reuter report states that the plan was suggested by Mr. Julius Kruttschnitt, American-born chairman of Mount Isa Mines.

Denmark to Have Oil Refinery?—Plans for the construction of an oil refinery in Denmark, with an annual capacity of about 390,000 tons—equal to about one-third of the present total oil requirements of the country—are soon to be debated in the Danish Parliament, states the London *Petroleum Press Service*. A company is to be formed, with Government participation, with the Danish shipbuilding company of A. P. Moeller, Copenhagen, and the Kjöpparsbergs Berglas A/B, a Swedish concern, which runs a refinery at Göteborg, Sweden, as other main shareholders. Copenhagen or Nyborg are the most likely locations of the projected plant.

Fresh Oil Source in the M.E.?—The Syria Petroleum Company are reported to have discovered a "wide petroleum area" in North-East Syria. The Syrian Government is studying present Saudi Arabian and Persian oil agreements before granting a concession to the company.

\$2 Hourly for Atomic Plant Workers.—Resulting from a new wages award conferring increases of from 5 to 24 cents per hour on U.S. atomic plant workers at Oak Ridge, Tennessee, employees in the largest section, the gaseous diffusion process plant, will earn on the average \$1.59 (nearly 8s.) hourly and the highest paid will receive \$2.07.

Italian Pharmaceutical Costs.—The scale of inflation in Italy is reflected in the claim by Italian pharmaceutical manufacturers that the thirty-fold increase in permitted prices does not compensate for the steep rise in production costs. There are now some 800 manufacturing undertakings employing about 20,000 and stated to be capable of supplying nearly all domestic demand.

German Fuel Gas for Holland.—Germany is to sell to Holland 80-90 million cu. m. of fuel gas a year for at least ten years under a long-term contract. The Anglo-American Joint Export-Import Agency said the gas will be supplied by pipeline to the Netherlands State mines for use in manufacturing ammonia and supplying towns near the border.

Italy's Restored Aluminium Industry.—Italy's aluminium output is expected this year to equal the pre-war figure of approximately 30,000 metric tons, a quantity which will cover domestic needs and leave an export surplus. Bauxite is being imported chiefly from Yugoslavia and France and the finished goods are marketed in Latin America, the Near East, India and Australia.

Expanding Austrian Magnesite Industry.—According to Swiss Press reports, to intensify the utilisation of Austria's large-scale magnesite deposits, an agreement has been concluded between Alpine Mining Company, Mayrhofen, Tyrol, and the Austrian-American Magnesite Works, Radentheim, permitting the latter (which is active in Carinthia), to take over the works of the former company. A new electric furnace is reported to have been installed at the Zillertalalpe works. A second magnesite works is to be erected at Hochfilzen, in the Tyrol.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

PEAT FUEL & PRODUCTS, LTD., London, E.C. (M., 25/9/48.) August 20, £1000 debenture, to P. W. Meade-Newman, London; general charge.

ELECTRODE WELDING CO., LTD., London, N.W. (M., 25/9/48.) August 20, debenture, to Barclays Bank, Ltd., securing all moneys due or to become due to the bank; general charge. *Nil. March 30, 1948.

NEW PROCESS WELDERS, LTD., London, S.W. (M., 25/9/48.) August 17, debenture, to Barclays Bank, Ltd., securing all moneys due or to become due to the bank; general charge. *£8150. December 31, 1946.

STRONTIUM PRODUCTS, LTD., Bristol, mining company. (M., 25/9/48.) August 16, charge, to Bristol Permanent Economic Building Society securing £6000 and any other money, etc.; charged on Newland House, Newland (Glos.). *Nil. May 10, 1948.

PEST CONTROL, LTD., Bourn (Cambs.). (M., 25/9/48.) August 23, £4500 and £2730 mortgages, to Coventry Permanent Economic Building Society; respectively charged on land and messuages known as Little Finchden, Leigh Green, Tenterden, and certain land adjoining and on Whitegates, Foxton. *£344,000. April 26, 1948.

Satisfactions

STEWART PLASTICS, LTD., London, S.W. (M.S., 25/9/48.) Satisfaction August 14, £2800, etc., registered May 15, 1946.

BRITISH ALLIED PRODUCTS, LTD. (formerly BRITISH ALLIED METALS, LTD.), London, W.C. (M.S., 25/9/48.) Satisfaction, August 18, of mortgage and charge registered June 30, 1947.

New Companies Registered

Durazone (Ireland), Ltd. (12,558).—Private company. Capital £1000. Manufacturers of chemicals, chemical compounds and chemical substances, etc. Subscribers: J. D. Kierman, 11 St. Stephen's Green, Dublin, V. Dillon.

Company News

The name of Lantigen Laboratories (England), Ltd., Pinewood, College Ride, Bagshot, Surrey, has been changed to Lantigen (England), Ltd., as from September 1, 1948.

The nominal capital of Eaton Plastics, Ltd., 137 Regent Street, London, W.1, has been increased beyond the registered capital of £100 to £4900, in £7 7½ per cent redeemable cumulative shares.

Chemical and Allied Stocks and Shares

A PART from strength of aircraft shares in the rearmament section, stock markets remained uncertain because of the belief that a critical stage has been reached in international affairs. British Funds, after earlier strength, lost a little ground, and leading industrials were generally slightly lower on balance, although movements in most cases did not exceed more than a few pence. Whereas buyers were holding off, there was little selling, and sentiment was helped by full details of the success achieved by the big Imperial Chemical issue. Including "excess" shares, shareholders in fact applied for nearly 21,000,000 shares, so that the offer of 10,093,023 shares at 40s. 6d. each was subscribed twice over. This is a remarkable achievement when it is remembered that the offer was made at a time when markets generally have been uncertain and dominated by international fears. It is, of course, an illustration of the faith of shareholders in the company.

It will be recalled that the directors of I.C.I. have expressed the view that the 10 per cent dividend basis should be maintained on the larger capital. Imperial Chemical have been firm at 44s. 9d. with the new shares (20s. paid) at 23s. 7½d. It is expected that allotment letters in respect of the new shares will be posted to shareholders over the week-end.

Monsanto Chemical 5s. ordinary have changed hands around 58s. 9d., Fisons were 59s. 6d., Albright & Wilson 28s. 9d., and Amber Chemical 9s. 6d., while Laporte Chemicals 5s. ordinary were 20s. 3d. British Glues 4s. units held their recent rise to 21s. and business up to 9s. 6d. was recorded in British Drug Houses 5s. shares. Elsewhere, Morgan Crucible were dealt in around 53s. 6d., Midland Tar Distillers marked 33s. 6d., Ilford were 26s. 6d., and Dufay Chromex 2s. shares again changed hands around par. British Oxygen at 98s. 9d., British Aluminium 47s. 6d., and Borax Com-

solidated at 61s. 6d. were well maintained. Amalgamated Metal have again been around 19s. 9d. Turner & Newall were 76s. 6d., United Molasses 47s. 3d., British Plaster Board 24s. 9d., and the units of the Distillers Co. 27s. 9d.

Iron and steels were inclined to strengthen on rearmament considerations, but the tendency has been to await the expected Nationalisation Bill. Guest Keen were 48s. 6d., Dorman Long 31s. 6d., Thomas & Baldwins 14s. 10½d., and United Steel 28s. 7½d. T. W. Ward have been firm at 60s. 9d. on expectations of good results, although it is realised that the total distribution is unlikely to be increased above last year's rate. Courtaulds have been steady at 38s. 9d. and awaiting the financial results, British Celanese changed hands around 20s. Elsewhere, textile shares generally were fairly well maintained.

Metal Box firmed up to 99s. 4½d., and Dunlop Rubber strengthened to 73s. 9d. Lever & Unilever eased to 49s. 6d., and in response to the full results and good balance-sheet position, Triplex Glass 10s. shares were 25s. 6d. after touching 26s. Staveley Coal were again good, further improving to 83s. 6d., the market view being that sooner or later there is likely to be a partial return of capital to shareholders or a special distribution of some kind arising from Doncaster Amalgamated's capital return, Staveley having a 40 per cent interest in the share capital of the latter company.

Boots Drug 5s. ordinary were 52s. 4½d., Sangers 30s. 1½d., but Beechams deferred eased to 18s. 6d. Oil shares have been inclined to recede on the Palestine developments. Anglo-Iranian were £7 15/16, Shell 75s., and Burmah Oil 61s. 3d.

Next Week's Events

WEDNESDAY, SEPTEMBER 29

North-Western Fuel Luncheon Club. The Engineer's Club, Albert Square, Manchester, 12 noon. Opening meeting of the fourth annual session.

British Association of Chemists (London Section). Gas Industry House, 1 Grosvenor Place, S.W.1, 7.0 p.m. Coal symposium. Principal speaker, Dr. D. T. A. Townend.

WEDNESDAY, SEPTEMBER 29 and THURSDAY, SEPTEMBER 30

Institute of Welding. Wednesday, Institution of Civil Engineers, Great George Street, London, S.W.1, 2.30 p.m. Thursday, Institution of Mechanical Engineers, Storey's Gate, London, S.W.1, 10.30 a.m. Autumn meeting.

THURSDAY, SEPTEMBER 30

Oil & Colour Chemists' Association (London section). Lecture Theatre, The Royal Institution, 21 Albemarle Street, London, W.1, 6.30 p.m. Professor H. J. Emeléus: "The Impact of Radioactivity on Inorganic Chemistry—I, The Chemistry of Radioactive Substances."

FRIDAY, OCTOBER 1

National Smoke Abatement Society. Cheltenham. Annual conference.

SATURDAY, OCTOBER 2

Society of Public Analysts and Other Analytical Chemists. (North of England Section and Physical Methods Group). Stork Hotel, Queen Square, Liverpool, 1, 1.0 p.m. D. M. Smith: "Analysis of Rare Earth Oxides by Means of Emission Spectra"; J. A. C. McClelland: "Determination of the Rare Earths Using the Intermittent Arc"; N. T. Gridgeman: "The Chromatographic Estimation of Vitamin A in Whale Liver Oil."

Poland's Chemical and Metal Trading Groups

THE following are some of the centralised trading organisations in Poland announced by *The Board of Trade Journal* as being competent to engage in foreign trade, together with the chemical and other commodities in which they severally deal:—

Import and Export Central Agency for Chemicals and Chemical Apparatus, "Ciech," L.L.Co., Warsaw, Jasna 10. Import and export of dyestuffs, chemicals, products of the chemical industry and other industries related to it, as well as of apparatus and equipment for the chemical and pharmaceutical industry.

Central Iron and Steel Agency, *Katowice*, Ligonja 7. *Warsaw*, Aleja na Skarpie 21. Sale of iron and steel foundry products at home and abroad.

Combine of the Non-Ferrous Metals Industry, *Katowice*, Podgorna 4. Export of zinc and zinc products like zinc sheets, zinc white, red lead, gleit, and import of zinc and lead ores.

Central Agency for the Sale of Petroleum Products, *Warsaw*, Rakowiecka 39. Import and export of products of petroleum origin as well as ozokerite and mineral oil.

Vegetable Oils of Africa

Comparison of Annual and Perennial Crops

THE serious falling-off in recent years of oil supplies from Africa, down to about half pre-war level, is considered by Prof. H. Varon (*Oleagineux*, 1948, 3, Aug.-Sept., pp. 373-378) who makes interesting comparison with the December, 1947, issue of the *Inventaire Economique de L'Europe* in which total world production of vegetable oil in 1938, based on data of the International Food Council and other sources was given as 18.19 million tons, of which Africa's contribution was about 1 million tons. In making his review of the decline of African supplies Prof. Varon distinguishes between the annual crops, like groundnuts and cotton, and the perennial tree crops, such as those of the oil-palm and coconut, also the olive. The last-named and still more the oil-palm have maintained their productivity practically up to pre-war standards during the past few years.

While palm kernels, it is true, suffered some decline from 670,000 tons average for 1934-38 to 490,000 tons in 1945, this has been compensated by increased yields of palm oil, at least to some extent, especially in the Belgian Congo. But this has not greatly affected the world position, for which total output was down to 15.8 million tons in 1946, while world population has increased to 2300 million, requiring a further 105 million tons of fats—if they could be had. The difficulties which have operated to prevent realisation of increased supplies from Africa, including the persistent dryness which has depreciated the olive crop in the north, are considered by the professor, who also discusses the French and British plans for extended groundnut cultivation.

Comparison with Groundnuts

This latter development has to face certain features peculiar, more or less, to Africa, such as relatively poor soil, lack of labour, risk of soil erosion, etc. Against such conditions the oil-palm offers greater resistivity and promise than annual cultivated crops, but of course requires longer time to show any considerable increase, so far as plantations are concerned. It is also less adapted than the groundnut to meet conditions of over-production of oils and fats—if ever such return. This point, however, has been kept in mind in the British groundnut schemes.

The general conclusion would seem to be that the two crops—groundnuts and oil-palm products—are in some degree complementary; the former being a relatively short

term proposition is better adapted to meet fluctuations in demand.

From the French point of view, while modern large-scale European plantations, after the Belgian Congo pattern, are highly desirable, the chief practical problem is that of increasing output from indigenous forests and small native plantations on a family scale.

Eastern Competition

Such cultivations should be put in a position to meet the competition of Asiatic producers with their generally more fertile soil, more abundant labour, and often better mechanisation and transport. A further point noted is the comparative healthiness of climate, especially in hot humid districts, and reference is made to what are described as the remarkable researches of P. Gourou. These showed that the salubrity of inter-tropical countries is a resultant largely of rational cultivation (as illustrated by rice culture in the Far East) and would require a density of population which, in the forest areas of Africa, could only be achieved by concentration in favoured districts, to be gradually extended.

It goes beyond the scope of a technical journal to consider broadly all the social and economic factors, e.g., native community structure, etc., which have a bearing on agricultural and forest production in Africa; but the main problem appears to be how best to combine native development of the right type—if this can be known and defined—with European aid.

One means now being adopted by the French is the provision of oil-mills in suitable localities to assist the natives in realising their oilseed and nut crops. This is described in another paper by G. Bourlet (*Oleagineux*, 1948, 3, Aug.-Sept., pp. 363-372).

GERMAN PATENTS

THE second draft of a Bill relating to the liquidation of enemy property, including patents, was published in Belgium last month. (The first draft had been rejected last year by the Chamber of Deputies.) The new draft refers only to German property, and recommends that German patent and trade mark rights, which have not yet been declared to the authorities, shall become null and void three months after the passage of the Bill. Those in charge of the drafting hope thus to gain a complete list of all German patents and trade marks applied in Belgium.

Prices of British Chemical Products

AN active demand characterises most sections of the industrial chemicals market and the volume of inquiry both for home and export account has been fairly sustained during the past week. No important price adjustments have been reported and quotations generally are steady, with a firm undertone. The soda products continue in good request, with delivery specifications under existing contracts covering good quantities, and, as in other sections of the market, a certain amount of replacement buying has been in progress. Firm price conditions apply to the potash chemicals, offers of which find ready buyers. No further change in the quotations for the red and white leads is reported and the call for supplies is fully maintained. Business in the coal tar products market remains steady.

MANCHESTER.—Steady to firm price conditions continue to be reported in pretty well all sections of the Manchester chemical market, although actual movements, compared with recent weeks, have been few. The past few days have witnessed a steady home and export inquiry covering a wide range of light and heavy chemicals and new business

has been on a fair scale, especially in the alkali products. The textile and allied industries and other leading home users are pressing for deliveries against orders already placed, and in a good many sections supplies still tend to be barely equal to current needs. Business in the fertiliser market has been on quietly steady lines, the phosphatic and potash-containing materials especially being wanted. A brisk demand for most tar products is also reported.

GLASGOW.—During the past week business in the Scottish chemical market has shown signs of improvement, a fair volume of orders having been received. Prices on the whole have remained steady. The export market continues to show signs of improvement; inquiries received covering a wide range of chemicals, and quite a few orders have been booked.

Price Changes

Rises: Alum, ammonium carbonate, lead, carbonate, sodium sulphate (salt cake), pitch, pyridine.

Reductions: Lactic acid, red lead, white lead, sodium nitrite.

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton, £64; 80% pure, 1 ton, £66; commercial glacial 1 ton £79; delivered buyers' premises in returnable barrels: £4 10s. per ton extra if packed and delivered in glass.

Acetic Anhydride.—Ton lots, d/d, 11½d. per lb.

Acetone.—Maximum prices per ton, 1½ tons, £76 10s.; single drums, £77 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alcohol, Industrial Absolute.—50,000 gal. lots, d/d, 2s. 7½d. per proof gallon; 5000 gal. lots, d/d, 2s. 10½d. per proof gal.

Alum.—Loose lump, £17 per ton, f.o.r. **MANCHESTER:** £16 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. **MANCHESTER:** £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—**MANCHESTER:** £46 per ton d/d.

Ammonium Carbonate.—£48 per ton d/d in 5-cwt. casks. **MANCHESTER:** Powder, £50 d/d.

Ammonium Chloride.—Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £21 to £25 per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate.—**MANCHESTER:** £5 per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £78 and £76 10s. per ton.

Antimony Oxide.—£162 10s. per ton.

Antimony Sulphide.—Golden, d/d, as to quantity, etc., 4s. to 5s. per lb.

Arsenic.—Per ton, £40 5s. to £41 5s., according to quality, ex store.

Barium Carbonate.—Precip., d/d; 2-ton lots, £25 15s. per ton, bag packing, ex works.

Barium Chloride.—98/100% prime white crystals, 5-ton lots, £26/27 per ton, bag packing, ex works.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £26 10s. per ton d/d; 2-ton lots, £26 15s. per ton.

Bleaching Powder.—Spot, 35/37%, £11 10s. per ton in casks.

- Borax.**—Per ton for ton lots, in free 1-cwt. bags, carriage paid: Commercial, granulated, £80; crystals, £81; powdered, £81 10s.; extra fine powder, £82 10s. B.P., crystals, £89; powdered, £89 10s.; extra fine, £40 10s. Borax glass, per ton in free 1-cwt. waterproof paper-lined bags, for home trade only, carriage paid: lump, £77; powdered, £78.
- Boric Acid.**—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granulated, £52; crystals, £53; powdered, £54; extra fine powder, £56. B.P., crystals, £61; powder, £62; extra fine, £64.
- Calcium Bisulphide.**—£6 10s. to £7 10s. per ton f.o.r. London.
- Calcium Chloride.**—70/72% solid, £8 12s. 6d. per ton, in 4 ton lots.
- Charcoal, Lump.**—£25 per ton, ex wharf. Granulated, £30 per ton.
- Chlorine, Liquid.**—£29 per ton, d/d in 16/17-cwt. drums (3-drum lots).
- Chrometan.**—Crystals, 5½d. per lb.
- Chromic Acid.**—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.
- Citric Acid.**—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6½d., other, 1s. 5.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.
- Cobalt Oxide.**—Black, delivered, 6s. 7d. per lb.
- Copper Carbonate.**—MANCHESTER: 1s. 8d. per lb.
- Copper Chloride.**—(53 per cent), d/d, 1s. 10d. per lb.
- Copper Oxide.**—Black, powdered, about 1s. 4½d. per lb.
- Copper Nitrate.**—(53 per cent), d/d, 1s. 8d. per lb.
- Copper Sulphate.**—£42 10s. per ton f.o.b., less 2%, in 2-cwt. bags.
- Cream of Tartar.**—100%, per cwt., from 157s. per 1.2 cwt. lot, d/d.
- Ethyl Acetate.**—10 tons and upwards, d/d, £115 per ton.
- Formaldehyde.**—£31 per ton in casks, according to quantity, d/d. MANCHESTER: £32.
- Formic Acid.**—85%, £64 per ton for ton lots, carriage paid. 90%, £67 5s. per ton.
- Glycerine.**—Chemically pure, double distilled 1260 s.g., 123/1 per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.
- Hexamine.**—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.
- Hydrochloric Acid.**—Spot, 7s. 6d. to 8s. 9d. per carboy d/d, according to purity, strength and locality.
- Hydrofluoric Acid.**—59/60%, about 1s. to 1s. 2d. per lb.
- Hydrogen Peroxide.**—1s. 0½d. per lb. d/d, carboys extra and returnable.
- Iodine.**—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.
- Iron Sulphate.**—F.o.r. works, £3 15s. to £4 per ton.
- Lactic Acid.**—Pale, tech., £70 per ton; dark tech., £60 per ton ex works; barrels returnable.
- Lead Acetate.**—White, 110s. to 115s. per cwt., according to quantity.
- Lead Carbonate.**—British dry, ton lots, d/d, £116 10s. per ton.
- Lead Nitrate.**—About £115 per ton d/d in casks. MANCHESTER: £115.
- Lead, Red.**—Basic prices per ton: Genuine dry red lead, £106; orange lead, £118. Ground in oil: red, £130 10s., orange, £142 10s. Ready-mixed lead paint: red, £138 5s.; orange, £150 5s. (subject to increase of £1 10s. per ton).
- Lead, White.**—Dry English, in 8-cwt. casks, £116 10s. per ton. Ground in oil, English, in 5-cwt. casks, £139 10s. per ton.
- Lime Acetate.**—Brown, ton lots, d/d, £18 to £20 per ton; grey, 80-82 per cent, ton lots, d/d, £22 to £25 per ton.
- Litharge.**—£103 10s. to £106 per ton.
- Lithium Carbonate.**—7s. 9d. per lb. net.
- Magnesite.**—Calcined, in bags, ex works, £18 5s.
- Magnesium Carbonate.**—Light, commercial, d/d, £70 per ton.
- Magnesium Chloride.**—Solid (ex wharf), £27 10s. per ton.
- Magnesium Oxide.**—Light, commercial, d/d, £160 per ton.
- Magnesium Sulphate.**—£12 to £14 per ton.
- Mercuric Chloride.**—Per lb., for 2-cwt. lots, 7s. 6d.; smaller quantities dearer.
- Mercurous Chloride.**—8s. to 9s. per lb., according to quantity.
- Mercury Sulphide, Red.**—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.
- Methanol.**—Pure synthetic, d/d, £28 to £33 per ton.
- Methylated Spirit.**—Industrial 66° O.P. 100 gals., 4s. 10d. per gal.; pyridinised 64° O.P. 100 gal., 4s. 11d. per gal.
- Nickel Sulphate.**—F.o.r. works, 3s. 4d. per lb.
- Nitric Acid.**—£24 to £26 per ton, ex works.
- Oxalic Acid.**—£128 to £133 per ton packed in free 5-cwt. casks.
- Paraffin Wax.**—Nominal.
- Phosphoric Acid.**—Technical (S.G. 1.500). ton lots, carriage paid, £61 per ton;

B.P. (S.G.I.750), ton lots, carriage paid, 1s. 1d. per lb.

Phosphorus.—Red, 8s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.

Potash, Caustic.—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate.—Crystals and granular, 9½d. per lb.; ground, 10½d. per lb., for not less than 6 cwt.; 1-cwt. lots, 1d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £64 per ton for 1-ton lots, ex store; hydrated, £58 for 1-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Chloride.—Industrial, 96 per cent, 6-ton lots, £16.10 per ton.

Potassium Iodide.—B.P., 8s. 8d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 8½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 8d. per lb.; technical, £7 14s. 3d. to £8 6s. 3d. per cwt., according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £21 to £25 per ton, in casks, ex store.

Salicylic Acid.—MANCHESTER: 1s. 11d. to 3s. 1d. per lb. d/d.

Soda Ash.—58° ex dépôt or d/d, London station, £7 12s. 6d. to £8 7s. 6d. per ton.

Soda, Caustic.—Solid 76/77%; spot, £18 4s. per ton d/d.

Sodium Acetate.—£41 per ton, ex wharf.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 8d. per lb.; anhydrous, 7½d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite.—Powder, 60/62%, £28 7s. 6d. per ton d/d in 2 ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£45 to £47 per ton.

Sodium Cyanide.—100 per cent basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite.—Pea crystals 22s. 6d. per cwt. (2-ton lots); commercial, 1-ton lots, £16 per ton carriage paid. Packing free.

Sodium Iodide.—B.P., 10s. 2d. per lb. to 12s. 1d. according to quantity.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £103 ton.

Sodium Metasilicate.—£19 5s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98 per cent, 6-ton lots, d/d station, £19 15s. per ton.

Sodium Nitrite.—£28-29 per ton.

Sodium Percarbonate.—12½% available oxygen, £7 per cwt. in 1-cwt. drums.

Sodium Phosphate.—Di-sodium, £32 10s. per ton d/d for ton lots. Tri-sodium, £62 per ton d/d for ton lots.

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Silicofluoride.—Ex store, nominal.

Sodium Sulphate (Glauber Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER: £6 5s. per ton d/d station.

Sodium Sulphide.—Solid, 60/62%, spot. £23 per ton, d/d, in drums; broken, £23 15s. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £14 12s. 6d. to £16 17s. 6d., according to fineness.

Sulphuric Acid.—168° Tw., £6 10s. 2d. to £7 10s. 2d. per ton; 140° Tw., arsenic-free, £5 2s. 6d. per ton; 140° Tw., arsenious, £4 15s. per ton. Quotations naked at sellers' works.

Tin Oxide.—1-cwt. lots d/d £25 10s.

Titanium Oxide.—Comm., ton lots, d/d, (56 lb. bags), £97 per ton.

Zinc Oxide.—Maximum prices per ton for 2-ton lots, d/d; white seal, £75 10s.; green seal, £74 10s.; red seal, £73.

Zinc Sulphate.—No quotation.

Rubber Chemicals

Antimony Sulphide.—Golden, 3s. to 4s. per lb. Crimson, 2s. 7½d. to 3s. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached. £8 3s. 6d. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Bisulphide.—£37 to £41 per ton, according to quality, in free returnable drums.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£50 10s. to £53 10s. per ton, according to quantity.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 10 5/16d. to 1s. 5 3/4d. per lb.; dark, 10 1/4d. to 1s. per lb.

Lithopone.—90%, £33 12s. 6d. per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Phosphate.—Not quoted—temporarily unobtainable.

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, in January, £10 5s., rising by 1s. 6d. per ton per month to March, 1948.

Calcium Cyanamide.—Nominal; supplies very scanty.

Concentrated Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. No. 1 grade, where available, £14 18s. 6d.

"Nitro-Chalk."—£10 4s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £17 5s. per ton; granulated, over 98%, £16 per ton.

Coal-Tar Products

Benzol.—Per gal. ex works: 90's, 2s. 6d.; pure, 2s. 8 1/2d.; nitration grade, 2s. 10 1/2d.

Carbolic Acid.—Crystals, 11 1/2d. per lb. Crude, 60's, 3s. 6d. to 4s. 3d. MANCHESTER: Crystals, 10 1/2d. to 1s. 0 1/2d. per lb., d/d; crude, 4s. 3d., naked, at works.

Cresote.—Home trade, 6 1/2d. to 9 1/2d. per gal., according to quality, f.o.r. maker's works. MANCHESTER: 6 1/2d. to 9 1/2d. per gal.

Cresylic Acid.—Pale, 97%, 3s. 6d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 4d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, 4s. 4d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 10d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 4d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Naphthalene.—Crude, ton lots, in sellers' bags, £8 1s. to £12 18s. per ton according to m.p.; hot-pressed, £14 15s. to £15 14s. per ton, in bulk ex works; purified crystals, £28 to £43 5s. per ton. Controlled prices.

Pitch.—Medium, soft, home trade, 100s. per ton f.o.r. suppliers' works; export trade, £8 5s. to £9 5s. per ton f.o.b. suppliers' port. MANCHESTER: 100s. f.o.r.

Pyridine.—90/140°, 18s. per gal.; 90/160°, 14s. MANCHESTER: 17s. 6d. to 21s. per gal.

Toluol.—Pure, 3s. 2 1/2d. per gal.; 90's, 2s. 4d. per gal. MANCHESTER: Pure, 3s. 2 1/2d. per gal. naked.

Xylol.—For 1000-gal. lots, 3s. 8 1/2d. to 3s. 6d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £15 per ton; grey, £22.

Methyl Acetone.—40/50%, £56 to £60 per ton.

Wood Creosote.—Unrefined, from 3s. 6d. per gal., according to boiling range.

Wood Naphtha.—Miscible, 4s. 6d. to 5s. 6d. per gal.; solvent, 5s. 6d. to 6s. 6d. per gal.

Wood Tar.—£6 to £10 per ton.

Intermediates and Dyes (Prices Nominal)

m-Cresol 98/100%.—Nominal.

o-Cresol 80/81° C.—Nominal.

p-Cresol 34/35° C.—Nominal.

Dichloraniline.—2s. 8 1/2d. per lb.

Dinitrobenzene.—8 1/2d. per lb.

Dinitrotoluene.—48/50° C., 9 1/2d. per lb.; 66/68° C., 1s.

p-Nitraniline.—2s. 5d. per lb.

Nitrobenzene.—Spot, 5 1/2d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—1s. 2d. per lb.; P.G. 1s. 0 1/2d. per lb.

o-Toluidine.—1s. per lb., in 8/10-cwt. drums, drums extra.

p-Toluidine.—2s. 2d. per lb., in casks.

m-Xylylene Acetate.—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON: September 22.—For the period ending September 25, 1948 (October 9, 1948, for refined oils). Per ton, naked, ex mill, works or refinery, and subject to additional charges according to package; LINSEED OIL, crude, £200. RAPESKED OIL, crude, £190. COCONUT OIL, crude, £106 refined deodorised, £112 refined hardened deodorised, £116. PALM KERNEL OIL, crude, £105 10s., refined deodorised, £112; refined hardened deodorised, £116. PALM OIL (per ton c.i.f.), in returnable casks, £99 5s.; in drums on loan, £98 15s., in bulk, £97 15s. GROUNDNUT OIL, crude, £110 10s.; refined deodorised, £114, refined hardened deodorised, 40 deg. £118. WHALE OIL, refined hardened, 42 deg., £117; refined hardened, 46/48 deg., £118. ACID OILS, Groundnut, £94; soya, £92; coconut and palm-kernel, £97 10s. ROSIN: Wood, 40s. 6d. to 48s.; gum, 56s. to 62s. 6d. per cwt., ex store, according to grade. TURPENTINE, American, 87s. per cwt. in drums or barrels, as imported (controlled price).



MERCURIAL SALTS (ORGANIC)

Phenyl Mercury Compounds—Trade Name "MERSOLITE"

Phenyl Mercury Acetate	-	Mersolite 8
Phenyl Mercury Borate	-	Mersolite 90
Phenyl Mercury Chloride	-	Mersolite 2
Phenyl Mercury Hydroxide	-	Mersolite 1
Phenyl Mercury Nitrate	-	Mersolite 7

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Oil from Rubber Seeds

Disappointing Results of Ceylon Experiments

THE prevailing world scarcity of vegetable oils and their high prices gave rise recently to consideration of the possibility of collecting and marketing rubber seeds in Ceylon. A circular was issued inviting rubber estates to make experimental collections during the 1947 seed season with a view to determining the probable cost per ton under Ceylon estate conditions.

At the same time, two oil milling concerns agreed to make expression trials on a sufficiently large scale to determine the commercial possibility of expression of oil in Ceylon. The seed season of 1947 was, however, a complete failure, says the report of the Ceylon Rubber Research Board for 1947, just issued. This was because there was a most severe attack of *Phytophthora* pod disease for many years, and it was quite impossible for reliable information on collection costs to be obtained.

The two oil mills, however, did with some difficulty obtain sufficient seed for small scale trials, which were in both cases disappointing, particularly with regard to the

percentage of free fatty acids, which was unduly high, indicating that in spite of the fact that the seeds were heated immediately on receipt by the oil millers, enzyme activity had been too great between seed fall and expression.

These meagre results are sufficient to indicate, however, that in Ceylon the total available amount of seed must always be expected to be very much less per acre than in Malaya, where *Oidium* attack on the flowers and *Phytophthora* attack on the seed pods is almost negligible by comparison, and that if oil of satisfactory commercial quantity is to be obtained lypolytic enzyme activity must be at a minimum. This presupposes rapid collection and sterilisation of seed before extraction of oil commences.

Oil in North Mexico.—What is believed to be a major oilfield has recently been discovered near Reynosa, in Northern Mexico, near the U.S. frontier. This is stated to be the first time that oil had been struck in this area. Plans are being made for the construction of a pipeline from Reynosa to Monterey. Oil from this area is to be reserved for export only (*Petroleum Press Service*).

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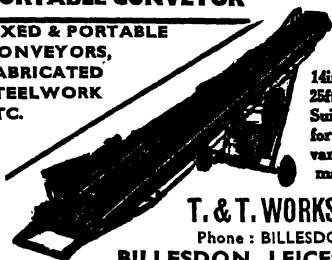
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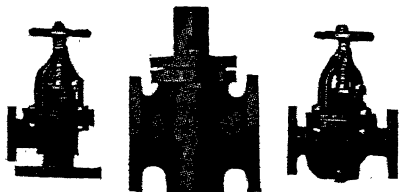
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The Narrowing Focus

IT is an old complaint, which has received attention before and has gained fresh currency now, that the chemist tends to become too much the man of one subject and too little the man of affairs. That is the traditional view, which, according to chemists, has been assiduously promulgated by those who are not chemists. There is, however, a good deal of truth in it. To some extent it is due to the incarceration of the chemist in his laboratory; it is difficult to be a man of affairs if one is not allowed to mix with one's fellows. Circumstances and industrial policies tend to keep the specialist chemist year after year doing admirable work in a subordinate position. Specialisation, it must be admitted, is often the result of conscious choice of environment, abetted by the deliberate policy of the employer, or it may be the consequence of absorption in the work in hand. This modern parallel of the cloistered life is certainly not without great compensations and the widening of the boundaries of science during the present century seems to demand the single-minded approach. There may, of course, be a difference of outlook on this subject according as a man is engaged on academic or industrial work.

There are few people better fitted to discuss this subject than Prof. John Read, author of that wide-ranging commentary "Humour and Humanism in Chemistry," and it is well that he has done so in his

address to the Chemistry Section of the British Association. Prof. Read does not consider the effects of specialisation on a man's industrial career, but on his outlook on life. The one, however, may be taken to embrace the other, for a man's outlook on life must profoundly affect the way he moulds his career.

Specialisation is a disease of modern times. Prof. Read can quote many examples of men of science, who up till quite recent times, could exchange Chairs with their colleagues in other branches of science without discredit or the fear of it. Boerhaave, who was described as "the most distinguished teacher of his times and a man of immense and varied learning in languages, philosophy, theology, mathematics, botany, chemistry, anatomy and medicine," was no exception. Even in the 1840's at Oxford, Charles Daubney held simultaneously the three Chairs of Chemistry, Botany and Rural Economy. Those were the days when a man could take all science for his field. The chemist was an all-round practitioner of his art, self-reliant, indeed a research unit in himself, if he engaged in that fascinating pursuit. He designed his own apparatus; often he made most of it; he conducted all his own experiments. The idea of teamwork in the modern sense was unknown. Those days are not far past; that was the common procedure 25 years ago. To-day, the vision of the student and the research

On Other Pages

Leader :		<i>Preventing Steel Corrosion</i> ...	455
<i>The Narrowing Focus</i> ...	439	<i>New, Light-Weight Mobile Welding Unit</i> ...	456
Notes and Comments :		<i>Stabilising Stainless Steel</i> ...	457
<i>Chemical Export Totals</i> ...	441	<i>U.K. Production and Stocks of N-F Metals</i> ...	458
<i>Links with Scandinavia</i> ...	441	<i>Determination of Iron and Manganese</i> ...	459
<i>Scientific Research Films</i> ...	441		
<i>Marshall Aid for Science</i> ...	442	<i>Growth-Resistant Iron</i> ...	461
<i>Good Reports from Copenhagen</i> ...	443	<i>Next Week's Events</i> ...	461
<i>Tonnage Exports of British Anti-Leprosy Drug</i> ...	444	<i>Turkey's Bid for Industrial Sufficiency</i> ...	462
<i>Value of Exports Maintained</i> ...	445	<i>American Aid for Science</i> ...	463
<i>Dust Problems in Industry</i> ...	446	<i>Explosion Tests</i> ...	463
<i>Depreciation and Maintenance—II</i> ...	448	<i>N-F Metal Supplies</i> ...	463
		<i>The Distillers Co., Ltd. (Company Report)</i> ...	467
METALLURGICAL SECTION			
<i>The Prospects for Titanium</i> ...	451		
<i>The Phosphating of Metals</i> ...	452		
<i>Electrolytic Metal Polishing—II</i> ...	453		

worker has narrowed, and so has his range of accomplishment in the laboratory.

The outstanding characteristic of the pioneers, says Prof. Read, was rich multi-formity and individuality, flowing from the diverse nature of their education and training, often obtained only with great difficulty. Many scientists who have specialised in one science are quoted in Prof. Read's paper as declaring the evil effect of specialisation on their own life and habits of thought. This habit has led to the segregation of chemists, to the detriment of chemists and of science at large. This lamentable tendency to withdraw from the world of affairs is, of course, not confined to chemists. Every profession, engineering, accountancy, company secretaryship, and so forth, tends to form its own private world. The difference between them and the chemist is that they are brought by the nature of their work more into contact with practical affairs and thus escape the strictures levelled against those who spend their lives in purely scientific pursuits.

"It will not be seriously contested," says Prof. Read, "that the intense specialisation which is an inevitable consequence of the expansion of science is bound up with serious handicaps." The problem is well understood. What is much more difficult is to determine how to solve

it. Science does not stand still. Knowledge which a century ago grew slowly, now increases in geometrical progression. The pace is more likely to quicken than to slacken. Specialisation will continue to be inevitable and may become narrower than it is to-day. The problem seems to be not of avoiding specialisation but rather of overcoming or reducing its ill-effects on the individuals. Prof. Read agrees with this view, it seems, and his answer is briefly that whatever is done must be done during the educational stage: mainly at school, partly at the university. A lively interest in literature, art, history, music and the drama should be fostered; once fostered, it must not be allowed to die. "If I had my life to live again," wrote Charles Darwin, "I would have made it a rule to read some poetry and listen to some music at least once every week; perhaps the parts of my brain now atrophied would thus have been kept active through use."

There was much more in Prof. Read's paper, but mainly in amplification of this theme. Two consequences follow. The first is that the practice of passing at school a difficult and extensive university entrance examination (or scholarship examination, which is much worse) in nar-

(Continued on page 442)

NOTES AND COMMENTS

Chemical Export Totals

THE August results of chemical trading overseas, having regard for the comparative shortness of the month—25 working days, compared with July's 27—again appear to show that this branch of the national economy is more firmly entrenched than many others. While exports of manufactured goods as a whole yielded only £115.2 million (£12.2 million less than in July) towards the grand total for the month of £130.5 million, the return of £4,147,669 from foreign sales of chemicals, excluding drugs and dyestuffs, was only some £73,000 less, and was more than £1 million higher than the return in August a year ago. This relatively steady basis of trading has prevailed throughout the chemical trading field, the totals for drugs and medicines (£1,236,866) and for dyes and dyestuffs (£530,411) representing approximately equivalent reductions from the higher totals recorded in July. That stability is agreeably manifest in most of the individual large-scale chemical exports; the comparatively few substantial reductions in volume are fully compensated by increases in other categories. Exports of ammonium sulphate (17,109 tons) and disinfectants, insecticides, etc. (40,749 cwt.) were each only about half as large as in July, although both compare well with the August, 1947, figures. There were, on the other hand, such large increases as those recorded for calcium carbide, 13,292 cwt. (1373 in July), salt, 19,310 tons (13,987), caustic soda, 227,549 cwt. (164,562) and sodium sulphate, 85,769 cwt. (51,512).

Links with Scandinavia

WITH the ending to-morrow (Sunday) of the British Exhibition in Copenhagen, which for a fortnight has translated for Danish audiences the hard facts of Britain's industrial capacity into tangible and attractive form, there is a natural impulse to look for concrete results in terms of trading contracts. That is a short-sighted view and, as the article by a special correspondent in this issue indicates, it is not likely to be gratified by a trade boom, or anything like it. Much more important is the evidence that many of this country's most useful chemical products for industry

and the excellent plant and laboratory equipment evolved here in recent years are now well established in Scandinavian regard, for the interest in the exhibition was by no means confined to Denmark itself. Such propaganda could not have come at a more opportune moment; in Sweden foreign trade is increasingly being directed into new channels through the scarcity of hard currencies (records the *Anglo-Swedish Review*). "One of the most striking features of Swedish trade figures for the first six months of the year," says this well informed review, "is the increase which has taken place in imports from the sterling area. Imports from Great Britain have risen by more than 80 per cent." That result is not confined to Sweden, as the current overseas trading figures of the U.K. bear witness. In the field of chemicals, drugs and dyestuffs Norway, Sweden and Denmark each gave the most reliable evidence last month of their readiness for closer integration with British industry, taking delivery of chemical goods worth some £573,000, compared with £316,000 in the same month a year ago.

Scientific Research Films

A CONFERENCE to be held in London shortly is stated to have the laudable aim of fostering international co-operation in scientific matters by means of the interchange between the countries of the world of scientific research films. This is a one-day conference on "The Film in Scientific Research," which is to be held at the Royal Institution, London, on October 12, under the aegis of the Scientific Film Association, and which will constitute a kind of winding-up session to the second International Scientific Film Congress which is being held from October 4 to 11 inclusive. Delegates from more than 20 overseas countries are expected to attend the congress, at which films produced by some 15 nations are to be shown. An official of the International Scientific Film Association informed *THE CHEMICAL AGE* that a suggested way of solving the language problem in connection with the international exchange of these scientific films—many of which have a sound track of a spoken commentary—is to circulate a duplicate of the photographic portion accom-

panied by a typewritten or printed script of the commentary in the language of the country in which the film was made. This latter would be translated into the tongue of the receiving country and form the basis of a new sound track, which would not need to be synchronised. It is also suggested that an international, multi-lingual catalogue of these films shall be made. The whole idea appears to have rich potentialities, chiefly as a practical means of fostering international co-operation in a scientific sense, and later perhaps as an avenue by which a much wider field for collaboration and understanding could be reached.

Marshall Aid for Science

THE vast and unparalleled economic experiment conveniently labelled as Marshall Aid is being given credit in advance as the lubricant which will infuse new life into moribund trade channels; comparatively little, however, has been said of the benefits which may also accrue to research in the recipient countries, and especially in the United Kingdom. \$500 million, the current allocation to the U.K., is sufficiently large a sum to permit

margins for the acquisition of scientific equipment in nuclear physics and some other fields in which American science, abundantly financed, has admittedly outstripped us in the methods of application. That view is borne out by Dr. Karl Lark-Horovitz, general secretary of the American Association for the Advancement of Science, who has been recommending that his country should make available here and elsewhere in Europe some of these specialised instruments, including surplus micro-wave equipment, widely needed in academic research in structure of molecules, atoms and nuclei. Dr. Lark-Horovitz's appeal for more tools for the scientists of Europe was stimulated by what he saw during a recent two-months' visit to European laboratories. He returned as an enthusiastic supporter of what he saw here, in Denmark and in Holland. "Research being carried on in Great Britain is one of the most exciting of all scientific centres today," he has told Economic Co-operation authorities in the U.S.A. "In all English laboratories there is not only a great deal of research work going on but it is work of the highest quality."

THE NARROWING FOCUS

(Continued from page 440)

rowly specialised subjects must cease, in order that the formative years shall be devoted to real education in the wider sense. Since, however, science requires ever more votaries, more time must be spent on education than in the past. Prof. Read says: "We shall probably agree that it would be well for the competent student who wishes ultimately to specialise fully in chemistry to devote four years to a course of study leading to an honours degree in chemistry, followed by two or three years of research work in a special branch of this subject." That means in effect that every chemist who aspires to mastery of his subject, and to a full life, should leave school at about the age of 18, take his degree (if he passes first time) at 23, and enter industry or the laboratory at 25 or 26. Can we afford this length of time, which will be extended by a year or two if military service is retained?

The answer may well be that we cannot

afford to do otherwise. We have to train a race of scientific men who can hold their own with the world. We make haste at our peril. To contract the years of training would be to invite the reproof which Prof. Read quotes as coming from Berzelius in quite another connection: "Das war geschwind aber schlecht" (That was fast but faulty).

That, it is evident, is a major problem that must be faced while education is in the melting pot. Those who can benefit from such a system of training, must be hand picked, trained in such a way as to avoid specialist one-track minds, and then enabled to become specialists in their subjects, without the danger of minds becoming partly atrophied by over-absorption. Ten years hence scientific knowledge may have leapt so far ahead that even more specialist training will be needed. If that is indeed the prospect, it is all the more necessary that the specialist shall possess a wide background of culture if he is to preserve his sanity.

GOOD REPORTS FROM COPENHAGEN

Marked Improvement in Goodwill and Trade Prospects

THERE has been large-scale support by the British chemical industry for the British Exhibition in Copenhagen which closes after a memorable fortnight's demonstration of Anglo-Danish goodwill.

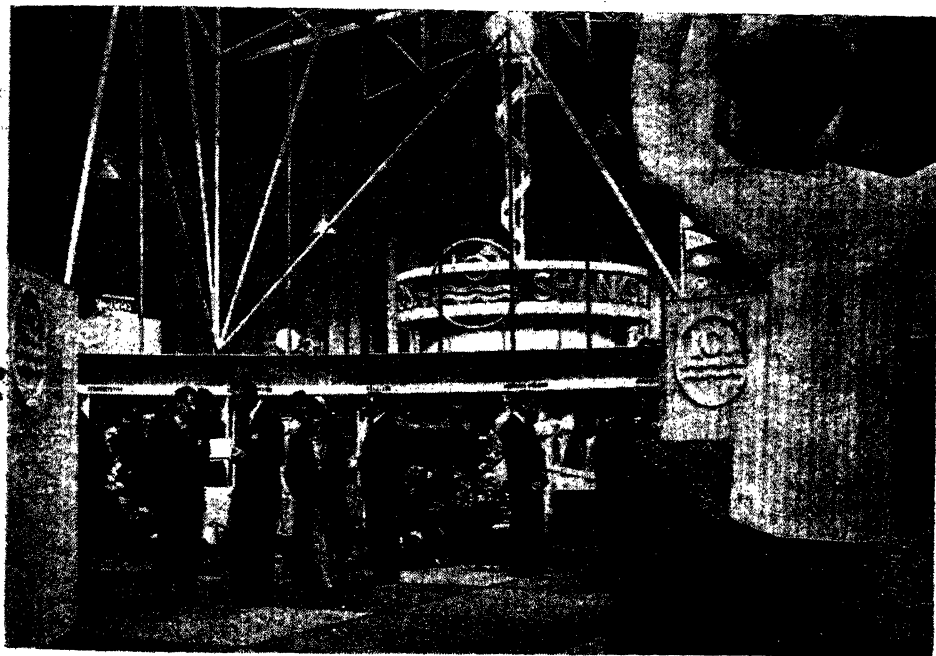
The exhibition has conspicuously increased the already pronounced goodwill in Denmark for Britain and for the products of British manufacturers, and while no immediate return in a substantial expansion of orders can be expected, the long-term prospect is that in this tangible way the exhibition will in due course yield a handsome dividend.

It is freely recognised, not least by the Danes themselves, that the market is a limited one and at the present time severely restricted by the import licensing regulations. Completion of the new Anglo-Danish trade agreement will, it is hoped, in the coming year permit of greater imports from

this country of manufactured articles, and the good harvest will enable Denmark to increase her shipments of foodstuffs to Britain which will in turn free more sterling for Danish purchases from British industry.

The significance of the Danish market for the products of the British chemical industry lies in the fact that two-thirds of Danish imports are paid for by exports of agricultural produce in the rearing of which a third of the entire population is engaged. Another important factor is the elimination of Germany as a source of supply of Danish requirements in the chemical field.

Prominent among the exhibitors, with three separate stands in the five centres in which the exhibition was staged, were Imperial Chemical Industries, Ltd., which featured its selective weed-killer Methoxone, and the insecticide Gammexane. Samples were shown also of the Alcan blue dye



The chemicals section at Copenhagen, in which more than one firm modernised and improved on their BIF displays. The I.C.I. arrangement in the foreground, effectively representing the derivation of dyes and agricultural chemicals, was a distinctive example

which enables textile printers to secure a non-fading turquoise blue colour.

The exhibition has shown to many of the Danish people for the first time since the liberation the quality of British post-war production and has demonstrated the merits in sound design and construction of British equipment. Danish business men have been noticeably impressed by the effort made by British firms to present their manufactures in a colourful and effective setting, which the Danes themselves have earned credit for providing.

The Danes have been a little fearful that the actual volume of firm business which will repel British exhibitors for their enterprise in participating may prove a disappointment. It is not possible, or reasonable, to attempt to measure the value of the exhibition to Britain in terms of orders placed on the spot or of Danish immediate capacity to buy.

Nor can the results be measured in terms of Danish trade alone. Copenhagen is commercially the strategic centre of Scandinavia and the exhibition attracted industrialists, importers and farmers in considerable numbers from Norway and Sweden

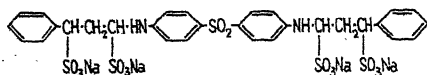
and to a lesser extent visitors from Holland, Belgium and France.

It is generally thought that British shipments of raw materials, chiefly coal and steel, under the new commercial treaty will pay for the bulk of Danish exports to Britain and that a considerable balance should remain for British chemical and other manufactured goods. Attention is now focused therefore upon the apportionment of this margin; but much will necessarily depend on the development of Danish exports to Great Britain and the further reduction of the adverse sterling balance of Denmark.

Importers are not unaware that until the basic needs of the country are satisfied a more liberal attitude by the Danish import licensing bureau to applications for licences for manufactured goods cannot be expected. There will be further negotiations later in the autumn relating to the allotment of licences to particular classes of goods, but while Denmark remains a debtor country there will be a natural reluctance to import commodities which local industries can also supply.

Tonnage Exports of British Anti-Leprosy Drug

CONSIDERABLE stimulus is reported to have been given to the manufacture and export of Sulphetrone (tetrasodium 4 : 4'-bis-(γ -phenylpropylamino)-diphenylsulphone- α : α' : γ' -tetrasulphonate), the British drug which is now being used increasingly in the fight against leprosy, as a result of favourable reports. Sulphetrone has been developed in the laboratories of the Wellcome Foundation, Ltd., London. Its chemical preparation has been described by Henry and Gray (1938) and by Buttle *et al* (1938). It is thought to have the following chemical structure:—



the molecular weight being 892.5.

Sulphetrone is prepared in the form of a white amorphous powder which is very soluble in cold water but insoluble in alcohol and other organic solvents. The stronger aqueous solutions (60 per cent) are stable when neutral or slightly alkaline and can be autoclaved. Weaker solutions are not so stable and the drug is not at present issued in solution form.

In April of this year, at the International Congress on Leprosy, held at Havana, Cuba, all the leading experts on the disease discussed the best forms of treatment, and

among the sulphones indicated for use the one of their choice was Sulphetrone.

In an interview at the Wellcome Laboratories, a representative of THE CHEMICAL AGE was informed that exports of Sulphetrone to the leprosaria of the world were expected to increase steadily. It was already possible to speak of them in terms of tons, and many tons would now almost certainly be exported annually. Practically the whole of the output would be sent to countries in the tropical belt.

Actual quantities were very difficult to estimate. The estimation of the number of lepers in the world varies between two and five millions, the reason for the gap being that the disease occurs chiefly in countries where the collection of statistics of any sort is non-existent. Organised treatment of the disease of leprosy is quite often left to be carried out by voluntary religious bodies, by whom the question of available funds has to be taken into account. Dosage also varies. Between one and two kg. a year has been found to be the average quantity needed for the treatment of a patient.

Other problems affecting the quantities of Sulphetrone which can at present be exported are the registration of the drug in various countries, and currency regulations. The drug is already being exported to America as well as to the sterling areas.

Value of Exports Maintained

Chemicals Yield £1.1 Million More Than Last Year's Total

ALTHOUGH not reaching quite such a high total as in July, the value of chemicals, excluding drugs and dyestuffs, exported from Great Britain in August was £4,147,869 as compared with £3,073,601 for the same month last year. The total compares well with the £4,520,840 total recorded in July, in which were two more working days.

CHEMICAL EXPORTS IN AUGUST

	Aug., 1948 Cwt.	Aug., 1947 Cwt.
Formic acid	2,454	3,377
Salicylic acid and salicylates ...	248,815	90,104
Tartaric acid	771	651
Value of all other sorts of acid ...	£85,548	£57,359
	Tons	Tons
Aluminium oxide	234	510
Sulphate of alumina	4,243	2,210
All other sorts of aluminium compounds ...	276	374
Ammonium sulphate	17,109	28,052
Ammonium nitrate	14,096	2,470
All other sorts of ammonium compounds ...	1,912	1,327
Bleaching powder	51,288	35,558
All other bleaching materials ...	7,856	5,085
Calcium carbide	13,292	1,294
Benzol	2,604	257,988
Cresylic acid	212,567	149,136
Tar oil, creosote oil, anthracene oil, etc.	2,471,276	3,194,111
Value of all other sorts of tar oil ...	£39,753	£31,185
	Cwt.	Cwt.
Naphthalene	7,612	1,796
Cellodion cotton	1,213	4,013
	Tons	Tons
Copper sulphate	887	809
Disinfectants, insecticides, etc. ...	40,749	49,558
Fertilisers	1,587	2,329
	Cwt.	Cwt.
Glycerine	2,126	160
Nickel salts	2,456	4,279
Lead acetate, litharge, red lead, etc.	9,751	5,677
	Tons	Tons
Magnesium compounds	756	923
	Gal.	Gal.
Methyl alcohol	7,463	82,659
	Cwt.	Cwt.
Potassium compounds	7,115	5,187
	Tons	Tons
Salt	19,310	16,092
	Cwt.	Cwt.
Sodium carbonate, etc.	452,803	228,344
Caustic soda	227,549	100,551
Synthetic sodium nitrate	50	—
Sodium silicate	11,808	6,343
Sodium sulphate	85,769	58,135
All other sodium compounds ...	96,020	70,128
	Cwt.	Cwt.
Cream of tartar	350	147
Tin oxide	888	536
	Tons	Tons
Zinc oxide	1,100	1,136
Total value of chemical manufactures, excluding drugs and dyestuffs	£4,147,869	£3,073,601

Exports generally, as shown in the latest issue of the *Trade and Navigation Accounts of the U.K.* (HMSO, 4s. 6d.), were satisfactory. Quantities of sulphate of alumina and all other sorts of aluminium compounds were double the figures for July, while salt showed a considerable increase.

The value of coal exports compared with August, 1947, was more than doubled.

	Oz.	Oz.
Quinine and quinine salts ...	159,629	113,141
	Lb.	Lb.
Acetyl-salicylic acid	111,760	119,258
	100	100
	Inter-	Inter-
	national	national
Insulin	424,038	574,572
	units	units
	Mega	Mega
	units	units
Penicillin	424,457	168,536
Total value of drugs, medicines and preparations	£1,236,866	£1,208,743
Total value of dyes and dyestuffs ...	£530,411	£505,634
	Cwt.	Cwt.
Plastic materials, other than casein and celluloid, etc.	30,726	20,465
Value	£386,431	£230,955
	Cwt.	Cwt.
Chemical glassware	1,191	1,309
Value	£40,759	£40,748
	Tons	Tons
Furnace plant	223	369
Value	£56,348	£66,537
	Tons	Tons
Coal	975,629	78,822
Value	£3,587,207	£161,773

CHEMICAL IMPORTS

	Aug., 1948 Cwt.	Aug., 1947 Cwt.
Acetic acid	23,332	9,974
Boric acid	2,200	4,000
Tartaric acid	—	900
All other acids	4,569	2,815
Borax	3,600	13,500
Bromine and bromides	—	1,468
Calcium carbide	24,350	42,020
Coal tar products, excluding benzol and cresylic acid	651	1,187
	Tons	Tons
Cobalt oxides	136	378
	Tons	Tons
Ammonium phosphate	—	3,062
Arsenic	447	1,189
Fertilisers	3,022	1,925
	Lb.	Lb.
Iodine	132,100	59,569
	Cwt.	Cwt.
Potassium chloride	313,530	775,532
Potassium sulphate	10,340	29,210
Other potassium compounds ...	4,024	5,803
Sodium nitrate	39,881	19,940
Other sodium compounds	3,865	18,531
Carbon black	68,927	109,308
Total value of chemicals, drugs, dyes and colours	£2,698,315	£2,591,018

DUST PROBLEMS IN INDUSTRY

Society of Chemical Industry's Conference at Leeds

SPONSORED by the Society of Chemical Industry, a conference on "Dust in Industry" was held at Leeds University on September 28, 29 and 30. Among the great variety of technical contributions by experts were the following:—

In the opening paper, Mr. G. Nonhebel, of Imperial Chemical Industries, Ltd., went to the root of the matter concerning industrial disease as it arises from the working of plant. The mathematics of physical chemistry play a more fundamental part than do many of the mechanical gadgets that are used, important though these are to help out the main safety principles. And it is upon these principles that more research must be carried out in the universities and in industry.

More Rapid Analyses

Mr. Nonhebel pleaded for more rapid methods of analysis of dust particles and a closer examination of the points of the plant where they arise. He was particularly interested in the aerated powders that have been developed (as catalysts) by the petroleum by-product industry during the war. Some idea of the importance of the health hazards concerned might be gathered from the fact that in America mammoth plants have been erected in which such dusts are circulated at a rate of over 30 tons per minute.

"Gas Explosions and Dust Explosions—A Comparison," by Dr. A. G. White and E. Jones.

Based on the results of an investigation of the dust explosion hazard in the preparation of pulverised fuels for use in explosives, a comparison is drawn between the inflammable properties of dust clouds and those of the better known gaseous explosive media. Useful generalisations like Le Chatelier's Rule and the Law of Flame Speeds, which summarise the "normal" behaviour of inflammable gases, are shown to be consistent with the view that flame propagation in gaseous media is a thermal process, the rate-determining factor being probably the temperature reached in the flame.

The calorific value of the gas mixture may be taken as an indication of the flame temperature in normal circumstances and this affords a convenient basis for comparing the explosive properties of gases and dusts. On applying these principles to dust explosions, certain striking anomalies are observed. For example, the calorific value of a lower limit

dust-air mixture can be much lower than that of a lower limit gas-air mixture, the amount of heat involved being quite inadequate to raise both the dust and the air to the ignition temperature of the dust.

This is explained on the assumption that the flame in a dust explosion is not necessarily continuous as in a homogeneous gaseous medium but that each particle of dust in the combustion zone may have its own aura of flame, the explosion flame thus assuming a granular structure in keeping with the medium of propagation. On the other hand, the calorific value of the lower limit mixture can be very much higher in a dust than in a gas, depending apparently on the ignition temperature, or sensitiveness to ignition, of the fuel.

The greater prominence of the latter factor in the case of dust explosions is attributed to the much greater thermal capacity of a solid fuel, particularly in relation to the amount of space it occupies. Attention is drawn to the probable effect of the varying terminal velocities of the dust particles on the mechanism of flame propagation through a dust cloud and the importance of volatility in facilitating ignition and communication of flame is also indicated.

"The Ignition of Dust Clouds by Electrostatic Discharge," by E. G. Cox and A. G. Pearce.

A survey of the available data shows that many dust clouds can be ignited by electrostatic discharges, and that the important factor determining ignition is the energy of the discharge. A rough estimate shows that in industrial processes, under abnormal but by no means impossible conditions, electrostatic charges can commonly accumulate sufficiently to make energies of up to 0.01 joules available for spark discharges, and that charges with energies five to ten times greater are easily possible. These charge accumulations can occur on any insulated conductor, including human bodies.

Ideal Protection

The ideal method of protection against explosion risk in industry in which air borne dispersions of fine dusts are likely to occur, is to prevent the accumulation of electrostatic charges, and to collect and remove the dust generated. Mere earthing of all conductors will prevent the accumulation of "free" charge on them, but this does not prevent the generation and accumulation of charge on non-conducting bodies.

such as rubber belts, or on the material being processed if this is itself an insulator.

"Reducing Contacts with Dust in Chemical Manufacture," by L. Marsden, G. W. Robertson and R. A. Storey.

The paper deals with the practical aspect of handling fine powders with particular reference to the manufacture of dyestuffs and intermediates. The reasons for the use of fine powders are given with a general outline of the problem leading up to the development of the designs for equipment. Four main sections are detailed with examples given in each case as follows:—

Two examples are given of simple hoods, one used for the charging of powders from drums into plant items, and the other an arrangement used when transferring powders from one drum to another.

The second group describes methods for charging powders into process vessels, three examples being given. The first is for charging lime into a lime slaker, the lime being delivered below the level of the liquor, the second is an arrangement of a retractable chute, and the third a vibrating feeder developed for feeding an alkali to give a controlled pH.

A third group gives details of the handling of dusty materials in the course of manufacture, and the three examples are a simple detraying cabinet for emptying dusty and dried materials into drums, a totally enclosed version of a similar type of equipment, and a totally enclosed reversing bag filter for separation of powders from a gas stream.

The fourth group gives information on a specially developed door where the chemical material processed is alternatively frozen and melted to provide the sealing of the door. Details of a vacuum tight valve used for discharging powders are given and a combined drum discharger, pre-crusher and pre-screening device.

Feeding Devices

Four separate devices are described for feeding material from process into packages. These are rotary feed table, a special sealing sleeve to connect between a chute and a drum, a similar device for feeding toxic dusty material into drums mounted on a weighing machine, and an automatic cask filling device arranged to fill material into a series of large packages.

"Particulate Clouds in the Gas Industry," by E. H. M. Badger, B.A., F.R.I.C.

It was found when heating coke ovens by means of producer gas from external producers that the regenerators were becoming blocked by a solid deposit. The producer gas was washed in scrubbers fed by tidal

river water and the gas leaving the scrubbers contained solids which had a high percentage of chlorine, but this chlorine was shown to come not from the water to the scrubbers but from the chlorine in the coke.

It was decided to install electrostatic precipitators, but these soon broke down owing to the formation of stalactites across the plates, which could only be removed by scraping. The problem of cleaning the gas was finally solved by evaporating into the gas a quantity of a tar oil, which condensed on the solid particles before they entered the precipitator.

Tar Fog

The condensation of liquid particles on solids also occurs in the formation of tar fog in coal gas or carburetted water gas. The drops of tar fog in high speed exhausters showed that it depended not only on the peripheral speed of the exhaustor, but on the temperature of the gas leaving the condensers and also on the design of the condensers.

These two factors are very important in determining the size of the drops entering the exhaustor. For good removal it is desirable that a given quantity of tar vapour should condense to a relatively small number of large drops rather than a large number of small drops.

Some light on the formation of liquid drops by condensation from a supersaturated vapour was afforded by the study of nitrogeous gum in coal gas. The phenomena observed could be explained on the basis that condensation takes place on particles, on gaseous ions or "spontaneously" (i.e., without nuclei) according to the degree of supersaturation.

Other papers read included:—

"Precautions Against Explosion and Fire," by G. V. Thom and G. A. V. West; "Dust Problems in Flour Milling," by Leslie Smith; "Dust Problems in the Photographic Industry," by R. G. R. Carnall; "Surface Area Measurements in Dust Control," by P. J. Rigden; "Dust in Over 2000 Foundries," by W. B. Lawrie (H.M. Inspector of Factories—Engineering and Chemical Branch); "Cosmetics v. Explosives," by Prof. W. M. Cumming and I. A. Brownlie; "Hazards of Explosives Manufacture," by Prof. W. M. Cumming, Dr. F. Rumford and W. G. D. Wright; "Arsenical Dust in Industry," by A. N. Currie; "Manganese Pneumonitis," by Dr. T. A. Lloyd Davies; "La Pénétration Pulmonaire des Toxiques Industriels: Exemple du Bioxyde de Manganese," by Le Doyen Prof. R. Fabre; "The Problem of Dust in the Cotton Industry," by Dr. D. W. Hill.

DEPRECIATION AND MAINTENANCE—II

Depreciation Accountancy for Chemical Equipment

By S. HOWARD WITHEY, F.Comm.A.

THE cost of maintaining machines and units of equipment in proper working order varies enormously between one operating period and another. This is true, notwithstanding that the technical staffs of most of the leading makers of plant of every description for the chemical, by-product and allied industries are at the service of users for dealing with a variety of sensitive products. Consequently, for the purpose of cost allocation the application of the "straightline" method of determining and recording plant depreciation on the lines exemplified in the previous article is not always satisfactory or equitable.

In some cases, wide fluctuations in the annual charge for upkeep and repairs are avoided by a careful estimate by engineers of the cost over a number of years and by allocating an equal proportion against each year's operations. In others, the total estimated cost of maintenance and the first or original capital cost of the plant give the amount to be spread over the period of service or useful life. So by dividing by the number of years during which the plant is expected to remain in commission at a fixed annual figure is available for inclusion in costs and contracts. The annual expenditure incurred in renewals and replacements is usually debited against a reserve maintained by periodical appropriations from the firm's disposable balance.

Current and Special Expenditure

While care may be necessary to distinguish between the many daily adjustments of a relatively trivial nature and the larger or more costly maintenance jobs—and minor repairs can usually be charged against standing orders and the really big jobs incorporated in specific costings—a general repairs and renewals account is kept by the majority of users of chemical plant, the individual items of expenditure being posted to the debit side as direct postings from the payments side of the cash book. It should never be forgotten, however, that if the book value of a displaced machine or a discarded section of equipment is written off and charged against the productive operations, the full cost of replacement, including transport charges and any installation or foundation expenses should be capitalised by debiting the appropriate asset account.

Unless the most stringent accuracy

is maintained both in the financial books and in the working books, it may be extremely difficult quickly to form proper decisions regarding the installation of new or additional plant or laboratory apparatus to meet urgent requirements. The decisions of chemical engineers in such matters must be governed largely by the behaviour and efficiency of the equipment previously employed on particular work, and the cost of repairs and upkeep involved in the different operations is, of course, always an important factor to be taken into consideration. By deducting a fixed percentage from each year's opening book value the burden of plant depreciation and maintenance can usually be equalised over the period of service life, because a progressive decline in the amount written off for depreciation would provide the margin required to cover growing upkeep costs.

An Example

For instance, the plant employed by a certain firm of chemical manufacturers was valued at £28,000 for balance sheet purposes at the end of December last, and it was decided that, having regard to the nature and extent of productive operations to be undertaken, the capital value of the firm's assets should be spread over the next six years in such a way that at the end of that time the book value of the chemical plant would be about £14,880. In January, 1948, additional units of plant were installed at a total cost of £5,000, and on the advice of engineers it was agreed to write down the book value of these additions to about £3,130 over six years. It was also anticipated that the annual cost of repairs, renewals, overhauls and adjustments of the entire profit-earning layout would increase from £250 in the first year to about £1,500 in the sixth year.

In order to spread the burden as equitably as possible over the period, the following depreciation computations were finally approved:—

First Year					£
10 per cent. of £28,000	...	...	...	=	2,800
7½ per cent. of £5,000	...	...	...	=	375
Depreciation	...	...	...	=	£3,175
Second Year					
10 per cent. of £25,200 (viz., £28,000 less £2,800)	...	...	...	=	2,520
7½ per cent. of £4,825 (viz., £5,000 less £175)	...	...	...	=	362
Depreciation	...	...	...	=	£2,887

Third Year		£
10 per cent. of £22,680 (viz., £25,000 less £2,520) ...	...	2,268
7½ per cent. of £4,278 (viz., £4,625 less £347) ...	...	321
Depreciation ...	...	£2,589

Fourth Year		£
10 per cent. of £20,412 (viz., £22,680 less £2,268) ...	...	2,041
7½ per cent. of £3,957 (viz., £4,278 less £321) ...	...	297
Depreciation ...	...	£2,338

Fifth Year		£
10 per cent. of £18,371 (viz., £20,412 less £2,041) ...	...	1,837
7½ per cent. of £3,660 (viz., £3,957 less £297) ...	...	275
Depreciation ...	...	£2,112

Sixth Year		£
10 per cent. of £16,534 (viz., £18,371 less £1,837) ...	...	1,654
7½ per cent. of £3,385 (viz., £3,660 less £275) ...	...	254
Depreciation ...	...	£1,908

The plant account will be credited with the amounts representing depreciation as computed above, each annual total being also recorded on the debit side of depreciation account the balance of which will be transferred to profit and loss. The total sum written off will decrease from £2175 in the first year to £1908 in the sixth year, and at the end of the period the account kept in the firm's private ledger will show the following entries:—

CHEMICAL PLANT ACCOUNT

DEBIT		£
1948		
Jan.	To Balance brought down ...	28,000
"	" Additions ...	5,000
		£33,000
1949		
Jan.	" Balance brought down ...	29,825
		£29,825
1950		
Jan.	" Balance brought down ...	26,958
		£26,958
1951		
Jan.	" Balance brought down ...	24,369
		£24,369
1952		
Jan.	" Balance brought down ...	22,031
		£22,031
1953		
Jan.	" Balance brought down ...	19,919
		£19,919
1954		
Jan.	" Balance brought down ...	£18,011

		CREDIT
		£
1948		
Dec.	By Depreciation written off ...	3,175
"	" Balance carried down ...	29,825
		£33,000
1949		
Dec.	" Depreciation written off ...	2,867
"	" Balance carried down ...	26,958
		£29,825
1950		
Dec.	" Depreciation written off ...	2,589
"	" Balance carried down ...	24,369
		£26,958
1951		
Dec.	" Depreciation written off ...	2,338
"	" Balance carried down ...	22,031
		£24,369
1952		
Dec.	" Depreciation written off ...	2,112
"	" Balance carried down ...	19,919
		£22,031
1953		
Dec.	" Depreciation written off ...	1,908
"	" Balance carried down ...	18,011
		£19,919

The application of the "straightline" method to the above set of circumstances would result in the sum of £2498 being charged against each year's profits to cover depreciation, this figure being arrived at by deducting £18,011 (estimated book value six years' hence) from £33,000 (the opening capital value) and dividing by six. The combined charge for upkeep and depreciation would then increase each year, while the plant itself is declining in value, whereas the "percentage" method of computation and accounting would provide the margin needed to cover plant maintenance, and would apportion the burden much more evenly, as demonstrated below:—

	Depreciation	Maintenance	Total
	£	£	£
1st year ...	3,175	250	3,425
2nd year ...	2,867	550	3,417
3rd year ...	2,589	830	3,419
4th year ...	2,338	1,080	3,418
5th year ...	2,112	1,300	3,412
6th year ...	1,908	1,500	3,408

The only real difficulty in applying this method consists of determining the precise percentage by which to reduce each year's opening book value, and as a guide the following table will be found useful; it gives the decimal part remaining at the end of each year up to 25 years after depreciating £1 at varying rates:—

	2	5	7½	10
	Per cent.	Per cent.	Per cent.	Per cent.
1 ...	.9800	.9500	.9250	.9000
2 ...	.9604	.9025	.8556	.8100
3 ...	.9412	.8574	.7914	.7290

4	...	...	.9223	.8145	.7821	.6561
5	...	...	.9039	.7738	.6772	.5905
6	...	...	.8858	.7351	.6264	.5314
7	...	...	.8681	.6884	.5794	.4783
8	...	...	.8507	.6635	.5359	.4304
9	...	...	.8337	.6303	.4957	.3374
10	...	...	.8170	.5988	.4586	.3486
11	...	...	.8006	.5689	.4242	.3138
12	...	...	.7846	.5404	.3924	.2824
13	...	...	.7689	.5134	.3629	.2542
14	...	...	.7536	.4878	.3357	.2288
15	...	...	.7385	.4634	.3105	.2059
16	...	...	.7237	.4402	.2872	.1853
17	...	...	.7092	.4182	.2657	.1668
18	...	...	.6951	.3973	.2458	.1501
19	...	...	.6812	.3774	.2273	.1351
20	...	...	.6675	.3585	.2103	.1216
21	...	...	.6542	.3406	.1945	.1094
22	...	...	.6411	.3236	.1799	.0985
23	...	...	.6283	.3074	.1664	.0886
24	...	...	.6157	.2921	.1539	.0798
25	...	...	.6034	.2775	.1424	.0718

For example, the table shows that the plant valued at £28,000 will be reduced to £28,000 by .5314, or £14,879, at the end of six years after being subjected to annual deductions of 10 per cent, based on the diminishing book values, and the general conclusion to be drawn is that when costs of upkeep are likely to expand, the "percentage" method of determining depreciation is much more satisfactory than writing off an equal proportion of the capital cost each year.

On a smaller scale, a somewhat extreme case is that of a firm employing activated carbon adsorption systems for certain processes of extraction, recovery and purification, and which had always been able to obtain the highest efficiencies at relatively low cost. After many years' service, the plant had a book value of £3000 as at December 31 last, and owing to the need for dealing with very sensitive products it was considered advisable to write off this old plant over a period of three years on the assumption that the material and parts would then realise about £650.

The planning department was instructed to prepare a budget for plant maintenance charges over three years, and this showed progressive increases as below:—

PLANT MAINTENANCE CHARGES				
				£
1st year	...	...	...	600
2nd year	...	...	...	1,200
3rd year	...	...	...	1,600

Including transport charges and installation expenses, the new plant cost £12,000, and was expected to be worth over £7000 in five years time. As it was desired to incorporate a uniform figure in the contracts on hand, the calculations of depreciation were made as follows:—

First year				
40 per cent of £3,000	...	...	...	£ 1,200
10 per cent. of £12,000	...	...	...	1,200
Depreciation	...	...	...	£2,400

Second Year				
40 per cent of £1,800 (viz., £3,000 less £1,200)	...	...	...	£ 720
10 per cent of £10,800 (viz., £12,000 less £1,200)	...	...	...	1,080
Depreciation	...	...	...	£1,800

Third Year				
40 per cent of £1,080 (viz., £1,800 less £720)	...	...	...	£ 432
10 per cent of £9,720 (viz., £10,800 less £1,080)	...	...	...	972
Depreciation	...	...	...	£1,404

At the end of the three years the distillation and evaporating plant will be made in the manner indicated below:

DISTILLATION AND EVAPORATING PLANT

DEBIT				
1948				
Jan.	To Balance brought down	...	...	3,000
"	" Additions	...	...	12,000
				£15,000
1949				
Jan.	" Balance brought down	...	...	12,600
				£12,600
1950				
Jan.	" Balance brought down	...	...	10,800
				£10,800
1951				
Jan.	" Balance brought down	...	...	9,396
1948				
Dec.	By Depreciation written off	...	...	£ 2,400
"	" Balance carried down	...	...	12,600
				£15,000
1949				
Dec.	" Depreciation written off	...	...	1,800
"	" Balance carried down	...	...	10,800
				£12,600
1950				
Dec.	" Depreciation written off	...	...	1,404
"	" Balance carried down	...	...	9,396
				£10,800

By computing depreciation in the manner shown, the annual debit is equalised, enabling the same charge to be made against each year's profits, thus:—

	Depreciation	Maintenance	Total Debit
	£	£	£
1948	2,400	600	3,000
1949	1,800	1,200	3,000
1950	1,404	1,600	3,004
	£5,604	£3,400	£9,004

(To be continued. Part 1 of this article appeared on August 21)

Metallurgical Section

Published the first Saturday in the month

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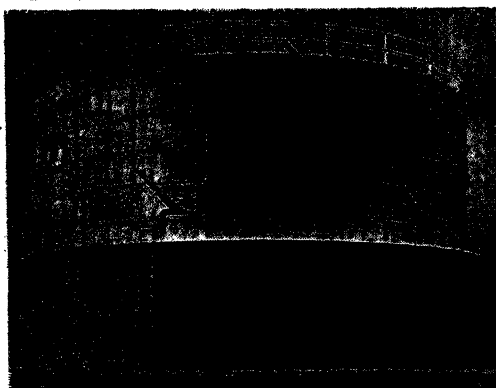
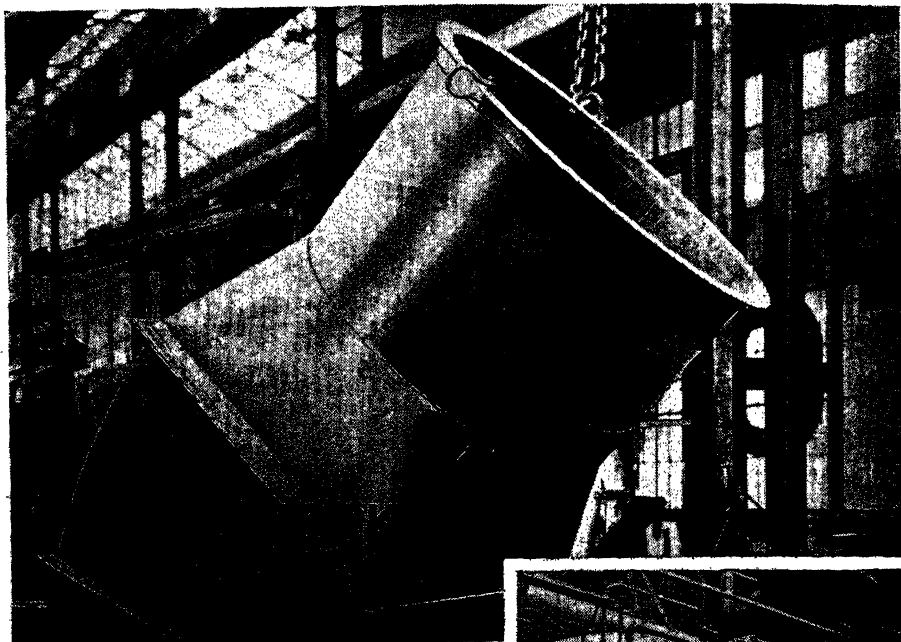
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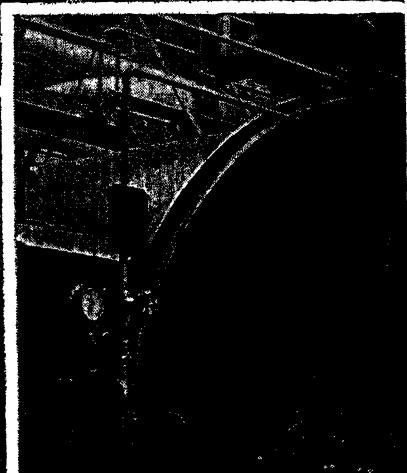
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Metallurgical Section

2 October 1948

THE PROSPECTS FOR TITANIUM New Potentialities as an Industrial Material

THE rising interest in titanium as a constructional metal instead of as the base of a pigment or chemical material has been considerably stimulated by the large-scale plans of two U.S.A. companies to raise supplies by the construction of a titanium smelter at Sorel, Quebec (THE CHEMICAL AGE, September 25).

One of the most remarkable of the facts about titanium, to which little attention has been paid in the past, is that it is probably the seventh most common metal, and the ninth commonest element, in the earth's crust; it is more than a hundred times as plentiful as copper, zinc, or lead.

Titanium metal, however, is difficult to separate in pure form from its ores; a fact that has kept it practically a laboratory curiosity since its discovery as a chemical element some 175 years ago. As with other metal, it exists in many places but only when found in concentrated deposits is separation of titanium commercially feasible.

Plentiful Resources

Known deposits of rutile and ilmenite, the ores from which it comes, are tremendous both in the U.S.A. and Canada. Some ore is now imported, but the resources here are considered to be large enough to make America independent of overseas supplies. Deposits are now being worked in New York, Florida, Virginia, North Carolina, and Canada.

Titanium metal is relatively so new as an industrial material that little is known about what it will do. Indications are, however, that it can be used where a high ratio of strength to weight is needed. Reports from the Bureau of Mines suggest that an early major use may be in high speed aircraft and other forms of transportation. It may also go into equipment resistant to corrosion and industrial machinery, such as printing presses and textile equipment.

The Du Pont Company are producing and offering it for exploration as a basic raw material for industry and engineering. Meanwhile, their technologists are carrying out preliminary design work to expand production and improve the present manufac-

turing process. Other organisations are also doing research, but much work will be necessary to develop the full potentialities of titanium metal, to determine not only its uses but also its alloying possibilities.

Bright Prospects

If titanium alloys work out as expected, scientists believe they may have a new family of structural materials superior in many ways to any metals or alloys now known.

Technically, the properties of titanium metal are: atomic number 22; atomic weight 47.9; density 4.5; melting point about 3140°F., and boiling point about 9210°F. Its yield strength in annealed form is about 70,000 lb. p.s.i.; in cold worked form, about 100,000 lb. Ultimate tensile strength is 80,000 lb. p.s.i. annealed and 110,000 lb. cold worked.

The Du Pont Company has long used large quantities of the ore to obtain titanium in oxide form for paint pigments. Research leading to its production in metallic form grew out of this experience, and manufacture of the metal is being handled by the pigments department, the process being basically a chemical one.

Most titanium metal which has been available heretofore has been in powder form. Du Pont is producing it now in sponge form and will be shortly producing ingots weighing up to about 100 lb. Reaching not less than 99.5 per cent purity, the metal is ductile (i.e., can be fabricated and shaped by heating and pressure) and can be rolled and drawn readily. It has high resistance to breaking or pulling, and has high strength against distortion.

Samples for Testing

Present price of the Du Pont product is \$5.00 per lb. for quantities of 100 lb. or more in sponge form. Ingot prices will be set later. In the meantime the company has offered to supply small samples without charge to industrial and university laboratories for testing. As the process is improved and if demand warrants mass production of the new metal, the company hopes to be able to reduce the price sharply.

The Phosphating of Metals

Some Processes Recently Patented

AS is well known, the treatment of metal surfaces, especially iron or steel, with a phosphating solution or bath, either by immersion, brushing or spraying, has for many years been largely used as a protection against corrosion. This is achieved mainly by the metallic phosphate coating formed on the surface, but the effect is strengthened if paint is subsequently applied, as the adhesion of the paint and its general protective efficiency is considerably enhanced by the preliminary phosphating. Treatment with a phosphating solution is also employed as an aid to lubrication between moving metal parts.

Of three recent patents which have now become open to public inspection, in the name of the Pyrene Co., Ltd.—one of the leading British firms in this phosphating technique—the first one, E.P. No. 4509/1948 (Conv. date 9.5.40) relates to the lubrication of metal parts in moving contact, such as the cylinders and pistons of internal combustion engines and in other examples. The parts may be treated with a solution containing dihydrogen phosphates, *e.g.*, of zinc, to which has been added nickel or cobalt, or solution of nickel or cobalt dihydrogen phosphates. Oil or graphite may be applied after treatment, *e.g.*, by immersion in colloidal graphite solution (such as "Oildag") heated to about 140° F. and then dried.

Solution Pointage

The phosphating bath may be made up as follows: zinc dihydrogen phosphate 900 lb., zinc oxide 250 lb., nitric acid of 42° Bé 750 lb., sodium nitrate 600 lb., and sufficient water to make up to 5000 lb. When 70 lb. of the made-up solution are dissolved in 100 gallons of water a 20-point solution is obtained, containing the ingredients in the right proportion or pointage. Suitable additions are made periodically to keep up the strength. Instead of zinc dihydrogen phosphate that of other metals may be used, namely of cadmium, calcium, strontium or barium. Metal articles so treated are included in claims.

The two other patents relate to the phosphating of the surfaces of aluminium or its alloys. Such treatment of aluminium is a comparatively new development in phosphating, at least as compared with iron or steel, which dates back to the early Coslett methods.

In the Pyrene patent No. 4510/1948 (Conv. date 7.9.40) the claim is to increase paint adhesion and retard corrosion, and

the process is said to afford an improvement on the oxidised aluminium surfaces often recommended hitherto, and to be more economical. The special feature is the addition to the usual bath (zinc dihydrogen phosphate and an oxidising agent such as sodium nitrate) of a double fluoride, say, of sodium, *i.e.*, sodium fluosilicate. The temperature may be 180° F. and immersion time 5 min.; or the temperature may be raised to boiling point, and instead of dihydrogen phosphate, as such, addition to the bath may include barium carbonate and phosphoric acid.

Diverse Methods

In some cases, as when using nickel hydroxide and phosphoric acid, the coatings at boiling point were harder than at 180°. In other cases the converse held, *e.g.*, with cobalt carbonate. Under certain specified conditions time could be reduced to two minutes. In one of the examples free phosphoric acid was used, as such, without addition to or formation in the bath of dihydrogen phosphate. Such a bath containing free acid will pickle the aluminium surface without forming coating, until sufficient aluminium has been dissolved to form dihydrogen phosphate in the solution. A method is also proposed whereby a similar result can be obtained without sacrificing any of the aluminium surface. After phosphating, the articles may be rinsed in the usual way in chromic acid solution and then painted or treated with lubricant, for which they are now strongly absorbent; or they may be left as they are.

The third Pyrene patent, E. P. No. 4662/1948 (Conv. date 10.9.45), is an improved modification of the preceding for coating aluminium or its alloys with phosphates and fluorides, as already described in U.S. pat. 2312855, in which, among others, sodium fluosilicate was given by way of example, and possibility also mentioned of using other double fluorides including fluoborates.

It is claimed in the present patent that, as a matter of fact, the fluoborate has been found more suitable, especially for spray phosphating. But it does not retain its initial efficiency for any length of time and the bath has to be repeatedly renewed. A further claim in the present invention, therefore, as the use of fluoborate in boric acid solution and the bath may be renewed by simple addition of either fluoborate or boric acid.

ELECTROLYTIC METAL POLISHING—II

Advances Derived from French and American Research

From a Special Correspondent

IT seems likely that one of the principal industrial fields, as distinct from the purely scientific (physical or metallurgical), for electro-polishing will be in circumstances where ordinary mechanical methods are too cumbersome, difficult or costly; especially in relation to stainless steels of the high-chromium or chrome-nickel type, and for intricate and complicated shapes. In this field, therefore, it may be regarded rather as a supplement than as a substitute for the usual processes.

From the purely polishing or lustre-imparting point of view, control and conditions should be such that the projecting portions of the anode surface are dissolved at a much faster rate than the recessed portions. Lustre is then due to such preferential solution of peaks. Light rays directed to unpolished parts are diffusely reflected in many directions, while those directed to the polished surface are reflected substantially in the same direction to an extent depending on the degree of polish.

Most commercial alloys contain more than one solid phase. Carbon steel, for example,

consists essentially of iron and iron carbide, each phase having a different potential and hence different solubility in a given electrolyte. An important condition, therefore, is that all the solid phase in preferentially dissolved areas, shall be removed at substantially the same rate; and this imposes the main limitation in electro-polishing, namely, the difficulty of dealing with multi-phase alloys or metals containing non-metallic inclusions.

Such structures are, of course, subject to preferential attack at one or more of the solid phases and excessive solution of metal surrounding insoluble or slightly soluble inclusions. This results in the finish being marred by voids, pits, or inclusions in high relief (see J. Mazia, *Monthly Review of American Electroplating*—now *Plating*—1947, August, pp. 937-944).

Invention to-day is largely directed towards the preparation of electrolytes for specific purposes, on which a considerable amount of work has been done, e.g., at the Battelle Memorial Institute, resulting in several patents dating from 1942. It is interesting to note, too, the close relation between the various protective or anti-corrosion processes grouped under the term phosphating and electro-polishing, and the use of this latter as a preliminary to nickel—or other plating.

Mazia, metallurgist with the American Chemical Paint Co.—one of the leading pioneers in phosphating—points out (*loc. cit.*) that among the first patents for anodic cleaning of metals was that of Burns and Warner, U.S. Patent 1,658,222, using a phosphoric acid solution (70-100 per cent) at a temperature of 50-100°C., claiming improved methods of cleaning metal surfaces, and using an electrolyte specially adapted to ferrous metals. It was also adapted to preparing metallic surfaces for subsequent nickel-plating, for which the phosphoric solution was particularly suitable.

The very voluminous general and patent literature of phosphating contains many other similar references; but this of 1928 appears to be the first that actually covered electrolytic polishing—or cleaning—as part of the preparation of a surface for electro-deposition. Jacquet's work, jointly with H. Figour, in the laboratories of the Soc. Le Matériel Téléphonique, is said to have resulted in the discovery in 1929 of the electrolytic polishing process.

There is apparently not much difference in the dates of the independent French and

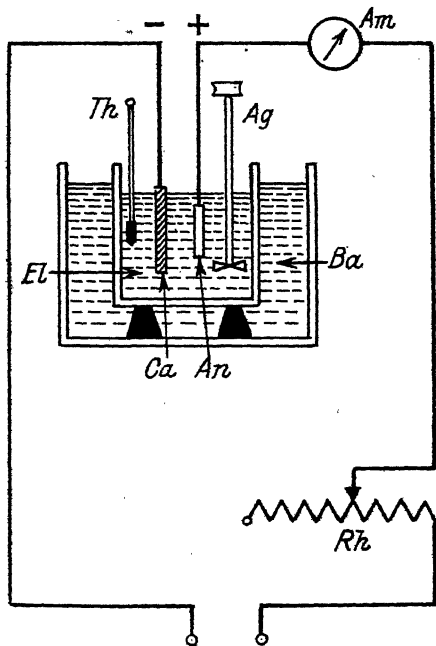


Fig. 1. The first Jacquet cell

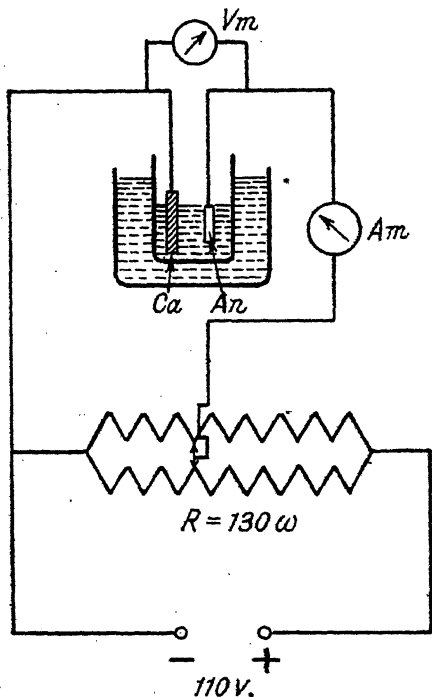


Fig. 2. The modified circuits

American work. Actually, Jacquet begins his book (Vol. 1) with a description of his method, first published in 1937 (*Comptes Rendus*, 1937, 205, p. 1232), for the electrolytic polishing of aluminium, and subsequently improved in 1943. The original cell is shown diagrammatically in Fig. 1.

The cold water bath as shown there, even with addition of ice, was not always a satisfactory method of temperature control, and the use of a coil acting as cathode was proposed by H. Granjon in a communication to the Société des Ing-Soudeurs (June 19, 1945). This was used for the metallographic examination of welds in light alloys. Another modification was the use of a rotating cathode to produce the required stirring of the electrolyte.

In the improved Jacquet cell special attention was paid to current density, temperature, size of specimens, and addition of perchloric acid or salt to electrolyte. A good deal of experimental work with this was carried out by Odier at the works of the Cie. Alais-Frogues et Camargue, to discover optimum conditions for polishing aluminium. A constant voltage of about 110 V. was one of them (although the possibility

of using higher potentials is discussed in the method devised by Grandjon and others. Odier's work was of considerable interest, and included the question of the possible inclusion of a potentiometer in the circuit. (Report to the Sub-Committee on Electrolytic Polishing, Paris, 1945). The circuit for Jacquet's modified scheme is shown in Fig. 2.

Several other systems are described, including those of the Aluminium Co. of America, De Sy and Haemers, Aluminium Werke A.G., Hauffe and Tilling, Löwgren and Hildebrand, Meert, Der Mateosian, von Hamos; and for magnesium, those of Jacquet and the Magnesium Metal Corporations, Ltd.

The risk of using perchloric acid in electrolytes is discussed. The tentative conclusion appears to be that further study of this is required, but that it is difficult entirely to exclude some risk of catalytic or other explosive decompositions.

(To be continued)

Tubing Standards Framed For Petroleum and Chemical Industries

TWO new British Standards produced in the interests of the petroleum industry have just been issued by the British Standards Institute.

B.S. 1464 for solid drawn aluminium brass and Admiralty mixture brass tubes provides for two classes of tubes for use in condensers and heat exchange equipment and includes approved chemical composition, mechanical requirements and details of tolerances. This standard is intended to replace the American specifications which have hitherto been used for this class of material and will enable British manufacturers to supply tubes required for overseas plants.

B.S. 1465 for flexible metallic tubing applies to tubing for the conveyance of steam, liquid fuels, lubricating oils and liquid asphalt at various temperatures and pressures. Details of construction and dimensions for various temperatures and pressures are given, and the conditions for a hydraulic test are also described.

Copies of the standards may be obtained from the British Standards Institute, 24 Victoria Street, London, S.W.1 (2s. 6d. and 2s. respectively, post paid).

PREVENTING STEEL CORROSION

Cathodic Protection of Underground Structures

SUCCESSFUL tests of electrical methods of protection against underground corrosion are reported by I. A. Denison and Melvin Romanoff, of the U.S. National Bureau of Standards. On six out of eight sites, corrosion of steel specimens was adequately prevented over periods ranging from three to six years by connecting zinc cylinders to the steel.

The tests revealed that the current required to prevent the corrosion of steel electrically was approximately equal to the current associated with normal corrosion and hence could be taken as a measure of the corrosion rate in the soils studied. The bureau concludes that cathodic protection is, under ideal conditions, a highly efficient means of combating corrosion of steel since all of the applied current is utilised in eliminating the local corrosion circuits.

If electric power is available, a cathodic protection unit can be economically installed; but pipe lines transporting oil, gasoline, and natural gas over vast distances often transverse areas of corrosive soils so remote from sources of power that the installation cost of cathodic protection, including the expense of rectifiers, may be great. Fortunately, a source of energy for cathodic protection in such areas can be

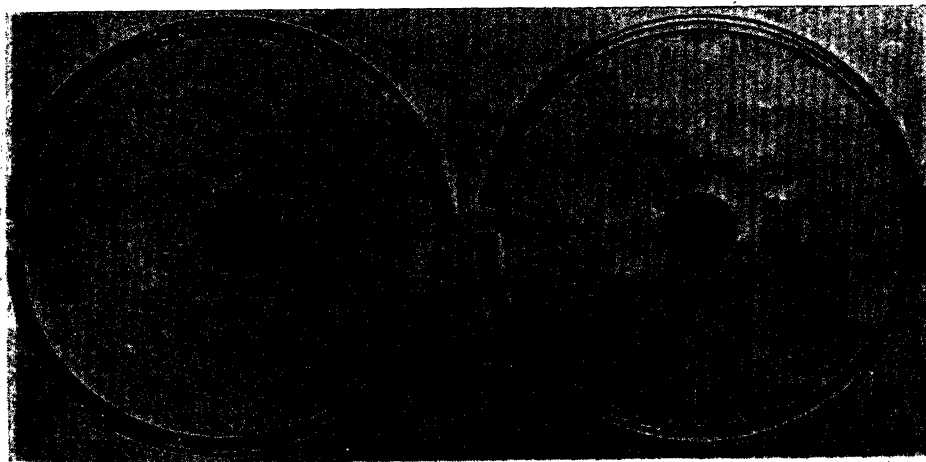
provided by the galvanic corrosion of bars of the electronegative metals, zinc, magnesium, or aluminium, buried at suitable intervals along the right of way connected to the pipe line. (THE CHEMICAL AGE, July 3.)

In order to investigate the behaviour of zinc anodes for cathodic protection in various types of soils, a series of field tests was initiated in 1941 in co-operation with pipeline companies, in which experimental zinc-steel couples were installed at eight test sites.

The cathode of the experimental couple was a small steel ring, to which was connected either one, two, or three cylindrical zinc anodes, giving ratios of the area of steel to zinc of 20, 10, and 6.7, respectively. By varying these ratios, the current density on the corresponding cathodes was subject to some control. Unconnected steel rings and zinc cylinders were also buried at each test site.

Degree of Protection

After periods of operation ranging from three to six years, the units were removed and the extent of cathodic protection provided was determined. Out of eight soils in which the couples were installed, six



Showing results of the field tests by the U.S. National Bureau of Standards in a study of cathodic protection against underground corrosion. C, unconnected steel ring and zinc cylinder, exposed for 5.8 years; D, steel ring connected to the zinc anode at the same site for 5.8 years. The steel ring (cathode) in D has conspicuously been protected from corrosion by connection to the zinc anode, which shows some loss of material, due to the flow of a protective galvanic current from zinc to steel

obtained satisfactory protection. Although a zinc-steel area ratio of 1:20 was sufficient for protection at three of these sites, an area ratio of 1:10 was required at the other three.

At the remaining two, high resistivity and high alkalinity of the soil tended to reduce the current output of the zinc anodes to such an extent that cathodic protection was not obtained. However, it is probable that both of these unfavourable conditions could be counteracted by surrounding the zinc anodes with a salt, such as calcium sulphate, which would not only increase the conductivity of the soil but would also prevent the formation of insoluble films or deposits of corrosion products on the zinc surface.

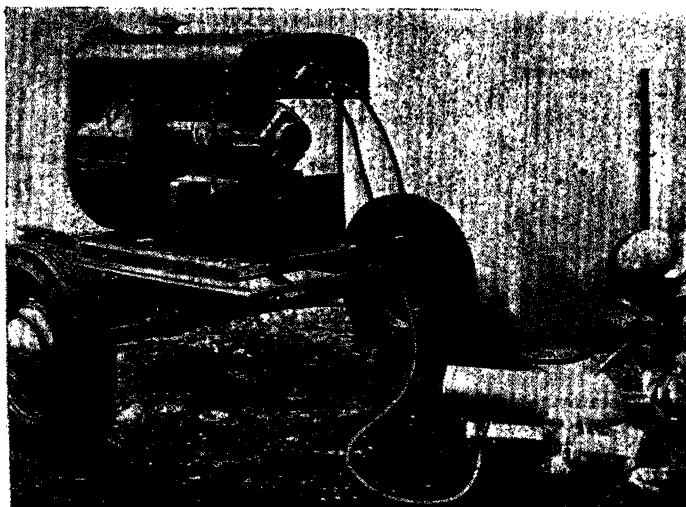
Galvanic currents and electrode potentials were measured at intervals during the course of the tests, while on conclusion, measurements of loss in weight of the steel rings and zinc cylinders, and maximum depth of penetration of the steel rings were made. The average value of the galvanic current, which was just sufficient to prevent corrosion, was found to be approximately equal to the average current associated with the normal corrosion of the unconnected steel rings. Therefore, to prevent corrosion in the localities studied, it is only necessary to apply a current equal to that discharged from the local anodic areas.

In the protection of pipe lines electrolytically, it is obviously desirable to be able to measure accurately the current that will just protect a given area. Otherwise, the pipe line may be incompletely protected, or, in the event of over-protection, expensive power may be wasted, with possible damage to adjacent structures on which the excess current would tend to collect and discharge.

Estimation of the current required for protection of underground structures of iron and steel is generally based on empirical procedures, none of which can be said to have theoretical justification. In an effort to establish a more scientific method for determining this current, a procedure suggested a number of years ago by the bureau was followed. The potential of the steel rings was measured as increasing currents were caused to flow toward the rings from an external source.

At low currents the potentials of the rings remained constant; but after some transition, the potentials were observed to increase linearly with the logarithm of the applied current. The value of the applied current that was just sufficient to prevent corrosion of the cathodes was found to be indicated approximately by the departure of the potential from the constant value at low currents.

New Light-Weight Mobile Welding Unit



The U.S. General Electric Company's new light-weight, engine-driven, d.c. welder, mounted on a pneumatic tyred trailer, shown in use fabricating a large diameter air-pressure pipe line. Designed for a wide range of general applications, this welder weighs only 660 pounds and affords a maximum of 260 amperes of welding current. It has an auxiliary power outlet of 110 volts for the operation of lights and power tools.

STABILISING STAINLESS STEEL

U.S. Report on Means of Increasing Resistance

(From Our New York Correspondent)

WORKING on the assumption that the susceptibility of austenitic stainless steel (18-8—18 per cent chromium—8 per cent nickel) to intergranular embrittlement or corrosion may be decreased or eliminated, by the addition of titanium or columbium, usually with a stabilising heat treatment, the U.S. National Bureau of Standards has just concluded a study of the problem.

This type of corrosion is particularly pronounced in some 18-8 steels which have been subjected to moderately elevated temperatures—700° to 1400° F.—and are either simultaneously or subsequently subjected to corrosive conditions. The bureau set out to determine the relative amounts of titanium or columbium necessary to stabilise these steels, the injurious effect of carbon content, and the necessity for stabilising heat treatments.

Using both experimental and commercial steels made to a base analysis of 18 per cent Cr and 10 per cent Ni, the effects of variations in carbon content, in the ratios of columbium to carbon and of titanium to carbon, and of different heat treatments, were studied.

The test ordinarily used to induce susceptibility to intergranular attack consists of heating the steel for 2 hours at 1200°-1250° F. (the sensitising treatment), followed by exposure for 2 days to a boiling solution of 100 ml. H_2SO_4 (sp. gr. 1.84), 100 g. $CuSO_4$, 5 H_2O , and 900 ml. distilled water. The specimens are then dropped on a steel plate to note whether they have lost their metallic ring, and are bent 180° over a rod whose diameter is equal to the thickness of the sample. The outer surfaces are then examined for cracks.

Steels which are immune to intergranular embrittlement have an unimpaired metallic ring and show no cracks after bending. Extremely susceptible steels lose their metallic ring completely and crumble on bending. In addition to these tests, all specimens studied were subjected to metallographic examination as well as to measurement of electrical resistivity, since intergranular corrosion increases this property considerably.

Sensitising Test

The investigation included a variety of test conditions, some of them quite severe, to study susceptibility to intergranular attack. Specimens were sensitised at temperatures ranging from 840 to 1380° F. for periods up to 21 days, and then exposed to the boiling acidified copper sulphate solution for 14 days. It was found that the most severe sensitising treatment was 8 or 21 days at 1020° F. Compared with this, the commonly specified treatment of 2 hours at 1200° F. is relatively mild.

Considering the steels which contained no stabilising elements, the tests showed that all were vulnerable to intergranular attack. Decrease in carbon content, however, decreased the degree of vulnerability.

In the columbium- and titanium-bearing steels, carbon content within the range of 0.06 to 0.13 per cent had no influence upon the resistance to intergranular attack, except as it influenced the Cb/C or Ti/C ratios. Steels varying in carbon content but having similar ratios of Cb/C or of Ti/C had approximately the same degree of susceptibility to

(Continued overleaf)



Fig. 1

U.K. Production and Stocks of N-F Metals

THE following particulars of production, stocks, consumption, imports and exports of non-ferrous metals in the United

Kingdom in August are extracted from the monthly figures supplied by the British Bureau of Non-Ferrous Metal Statistics.

UNWROUGHT COPPER			
	Long Tons	Blister Copper	Refined Copper
OPENING STOCKS:			
Govt. and consumers' stocks	29,348	70,560	
Imports into U.K.	17,804	18,139	
PRODUCTION:			
Primary	—	10,872	
Secondary	1,573	4,376	
CONSUMPTION:			
Primary	10,954	25,602	
Secondary	—	12,003	
EXPORTS FROM U.K.	1,105	4	
CLOSING STOCKS:			
Govt. and consumers' stocks	35,139	79,982	

GROSS OUTPUT OF MAIN COPPER, ALLOY AND PRODUCTS			
Unalloyed copper products	23,536	long tons	
Alloyed copper products	20,631	"	
Copper sulphate	703	"	

UNWROUGHT ZINC			
	Long Tons	Zinc in Concentrates	Slab Zinc (estimated gross (all grades) zinc content)
OPENING STOCKS:			
Govt. and consumers' stocks	23,885	52,390	
Imports	5,463	13,764	
PRODUCTION:			
Virgin and remelted	—	6,045	
CONSUMPTION:			
Virgin (incl. debased)	7,465	15,743	
Remelted and scrap	—	5,516	
EXPORTS	—	59	
CLOSING STOCKS:			
Govt. and consumers' stocks	21,617	61,341	

LEAD				
	Long Tons	Lead in Virgin	Imported	Lead Content of second-ary scrap and Residues
OPENING STOCKS:				
Govt. and consumers' stocks	—	20,122	2,190	—
IMPORTS	—	16,618	—	—
PRODUCTION	149	—	2,293	—
CONSUMPTION	149	12,895	2,158	9,390
EXPORTS	—	40	—	—
CLOSING STOCKS:				
Govt. and consumers' stocks	—	23,701	2,325	—

TIN METAL				
GOVT. AND CONSUMERS' STOCKS AT END OF PERIOD				Long Tons
PERIOD	—	—	—	10,282
IMPORTS	—	—	—	—
PRODUCTION	—	—	—	2,783
CONSUMPTION	—	—	—	1,608
EXPORTS AND RE-EXPORTS	—	—	—	131

ANTIMONY			
TOTAL CONSUMPTION OF ANTIMONY METAL AND COMPOUNDS			Long Tons
—			371
TOTAL CONSUMPTION OF ANTIMONY IN SCRAP			Long Tons
—			356

CADMIUM			
TOTAL CONSUMPTION OF CADMIUM			Long Tons
—			55.40

STABILISED STAINLESS STEEL

(Continued from previous page)

intergranular attack, regardless of the total carbon content. The steels showed greater resistance to attack when annealed at 1800° F. than when annealed at 1775° F.

Stabilising heat treatment at 1600° F. had a negligible effect upon the resistance to intergranular embrittlement of the columbium-treated steels so that these steels carrying a sufficiently high ratio of Cb/C may be used without stabilising by heat. However, the performance of the titanium-treated steels carrying the higher ratios of Ti/C was markedly improved by such treatments. When properly treated, substantially complete immunity to intergranular attack may be obtained with a minimum ratio of Cb/C=10 and Ti/C=5. For more "fool-proof" immunity, these ratios should be 12 and 8, respectively, the bureau reports.

The type of distribution of the precipitated carbides resulting from the sensitising

treatment is not an infallible indication of the resistance to intergranular embrittlement. Steels in which the carbides were irregularly distributed were usually resistant to intergranular attack. However, the susceptibility of steels containing carbides at the grain boundaries, even though these carbides were distributed as a continuous network depended on the time-temperature relationship during sensitised hours at 1200° F. and the other 2 days at the same temperature, were indistinguishable on examination of their microstructure (Fig. 1, A and B). Both showed a precipitation of carbides at the grain boundaries and on various slip planes. Their behaviour after exposure to the boiling acidified copper sulphate, however, differed radically (see Fig. 1, C). The specimen that had been sensitised for 2 hours suffered severe intergranular corrosion after 2 days' exposure, while that sensitised for 2 days showed no evidence whatever of intergranular attack, even after 14 days' exposure.

DETERMINATION OF IRON AND MANGANESE

Recent Findings of Russian Chemists

IN tin alloys, lead alloys, brass and bronze small amounts of iron may be simply and speedily determined by treating the acid solution of the alloy with granulated zinc to precipitate metallic copper, tin, antimony, etc., and determining the iron in solution with sulphosalicylic acid.¹

The method for tin-base Babbitt, brass and bronze is as follows: Dissolve 0.5 g. of sample in a mixture of 5 ml. of concentrated hydrochloric acid and 2 to 3 ml. of concentrated nitric acid, wash down the cover and sides of the beaker, and evaporate the solution to dryness. Cool, add 5 ml. of concentrated hydrochloric acid and repeat the evaporation. Then add 7 ml. of concentrated hydrochloric acid, heat gently to dissolve the salts, dilute with 53 ml. of water, and introduce 4 g. of granulated zinc. Cover the beaker and warm gently for 30 to 40 minutes. With brass and bronze this treatment is continued for 15 minutes after the solution becomes decolorised.

Filter off the precipitated metals, and wash the latter two or three times with cold water. Heat the filtrate to boiling point, oxidise the ferrous salts by adding 5 to 6 drops of perhydrol, and completely boil off the excess of peroxide. Cool the solution, transfer it to a graduated flask (100 ml.), add water to the mark, and mix well.

Transfer 15 to 30 ml., depending on the iron content, to a flask, add 3 to 6 ml. of 5 per cent sodium tartrate solution, and aqueous ammonia solution (about 10 per cent) until the basic zinc salts first precipitated are dissolved; then add 7 ml. more. Treat with 25 ml. of 10 per cent sulphosalicylic acid solution, make up to exactly 100 ml. with water, and compare the colour with standards.

The standard is prepared from a mixture of 53 ml. of water and 7 ml. of concentrated hydrochloric acid, taking 15 to 30 ml., as in the test. Add 3 to 6 ml. of sodium tartrate solution, neutralise to congo-red indicator with 10 per cent ammonia solution and add 7 ml. excess of the latter. Then add 25 ml. of 10 per cent sulphosalicylic acid solution and dilute to 100 ml. Match the colour of the test solution by adding dropwise from a micro-burette a standard solution of ferric alum, of which 1 ml. is equivalent to 0.05 mg. of iron. The standard ferric solution is prepared by dissolving 0.432 g. of ferric alum in water acidified with 4 ml. of concentrated sulphuric acid, and diluting to 1 litre with water.

Alternatively, the colour intensity may be assessed by means of a photocolorimeter.

The method for lead-base Babbitt is as follows:—

Dissolve 0.5 g. of the metal in 2 to 3 ml. of diluted nitric acid solution (1+1), add 5 ml. of concentrated hydrochloric acid, boil until the undissolved matter becomes white, evaporate to dryness, add 5 ml. of hydrochloric acid, and repeat the evaporation. Heat with 7 ml. of hydrochloric acid and 53 ml. of water to dissolve the salts, cool, filter off the precipitated lead chloride, and wash with diluted hydrochloric acid (7+53). Add 4 g. of zinc, and proceed as described above.

Manganese in Iron and Steel

If phosphoric acid is present in a solution containing manganese, the latter may be oxidised completely to permanganic acid by ammonium persulphate alone. The need for silver nitrate is thus avoided.²

The determination of manganese in steel or cast iron is carried out thus:—

Dissolve 0.2 g. of the sample in 50 ml. of an acid mixture prepared from 420 ml. of concentrated sulphuric acid, 160 g. of sodium phosphate, and 420 ml. of water. After dissolution, add concentrated nitric acid until the oxidising reaction ceases, evaporate to copious fumes of sulphur trioxide, cool, add 200 ml. of water, and then 50 ml. of 25 per cent ammonium persulphate. Boil for 15 minutes to oxidise the manganese and to decompose the excess of persulphate; cool, and titrate with standard sodium arsenite solution.

SOURCES

¹ *Rapid Colorimetric Method of Determining Iron in Babbitt Metal, Brass and Bronze.* (E. I. Fogelson and N. V. Kalmykova, *Zavod. Lab.*, 1946, 12, 973-974).

² *Determination of Manganese by the Persulphate Method but without Silver Nitrate.* (I. M. Engalychev and L. N. Ositkovskaya, *Zavod. Lab.*, 1946, 12, 980).

Belgian Steel Boom

The Belgian iron and steel industry is at present receiving the largest inflow of orders since the end of the war. Apart from the recent agreement with the U.K. for the delivery of 100,000 tons of steel, an order for some 50,000 tons has been placed by Czechoslovakia, Denmark has ordered an additional 25,000 tons and Argentina has contracted for 55,000 tons of material for ferro-concrete construction purposes. The U.S.S.R. has also placed new orders. Further orders are expected to result from ERP.

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GROWTH-RESISTANT IRON

THE problem of the "growth" of iron used for making castings when repeatedly heated to high temperatures is reported to have been overcome by metallurgists of Batelle Institute after several years of study. The new iron produced is said not to warp or buckle as a result of parts enlarging or shrinking with changes of temperature. This "growing" is not ordinary thermal expansion, but is the result of a change in structure within the metal.

Research for this new growth-resistant cast iron was sponsored by the Jackson Iron and Steel Company, Jackson, Ohio, which will market the silvery pig iron for its production. The casting is a high-silicon iron, silicon being the element which causes the resistance to growth; minor amounts of copper and chromium are added to make the product resistant to scaling at high temperatures.

The iron maintains satisfactory growth, scaling, and impact properties up to 1700°F.

Lead and Uranium Discoveries

The distinguished Danish Arctic explorer, Hr. Lauge Koch, returning from his Greenland expedition, reports that near King Oscar Firth on the east coast huge quantities of lead were found, estimated at 1 million tons, which could make Greenland the world's third largest lead supplying country, states *The Times'* correspondent from Copenhagen. The lead deposits are to be examined on next year's expedition, but no quick developments are expected as it would be necessary to build a special settlement for the export workers. Hr. Lauge Koch also reports that he has made discoveries of uranium but that it is still too early to estimate the quantities.

Increasing S.A. Copper Production

Increased copper production is reported at Northern Rhodesian mines. The foundations are being laid of a new plant at Nebanga to double production, the completion of which will have to depend to a large extent on the availability of materials from Britain. The Tsumeb plant in S.W. Africa went into production in record time by getting supplies from the U.S.A. The Mufulira works are also increasing plant and output considerably.

Bauxite Resumption in Malacca.—According to a report in the Dutch economic daily, *Economische Voorlichting*, bauxite mining, which has been interrupted since 1945, is to be resumed in Malacca.

Next Week's Events

MONDAY, OCTOBER 4

Society of Chemical Industry, first meeting of the session, London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 6.30 p.m. Dr. H. Baines: "The Photographic Latent Image."

MONDAY, OCTOBER 4-11

Scientific Film Association, 34 Soho Square, W.1. International Congress.

TUESDAY, OCTOBER 5

Society of Chemical Industry (Fine Chemicals Group), Royal Institution, Albemarle Street, W.1, 7 p.m. Prof. J. H. Burn: "Fine Chemicals for Medical Use"

WEDNESDAY, OCTOBER 6

Society of Public Analysts, Gas Industry House, 1 Grosvenor Place, W.1, 7 p.m. M. M. Muers and M. A. House: "Ether Peroxide as a Possible Source of Error in the Rose-Gottlieb Butterfat Test"; R. Aschaffenburg and J. A. Hall: "Standardisation of Hortvet Thermometers"; K. A. Williams: "Use of Reichert, Polenske and Kirschner values in the Determination of Butterfat, Coconut Oil, and Palm Kernel Oil."

WEDNESDAY, OCTOBER 6

Pharmaceutical Society of Great Britain, 17 Bloomsbury Square, London, W.C.1, 3 p.m. Opening of 107th session of the college and presentation of prizes.

THURSDAY, OCTOBER 7

Oil and Colour Chemists' Association (London section), Royal Institution, Albemarle Street, W.1, 6.30 p.m. Prof. H. J. Emeleus: "The Impact of Radioactivity on Inorganic Chemistry—II, The Experimental Study of Radioactive Substances."

Royal Institute of Chemistry (London and South-Eastern Counties Section), Technical College, Dagenham, 7 p.m. M. N. Booth: "Careers for Chemists."

SATURDAY, OCTOBER 9

Institution of Chemical Engineers (North-Western Branch), College of Technology, Manchester, opening meeting of session, 3 p.m. W. S. Norman: "Fluid Friction, Heat and Mass Transfer in Turbulent Flow."

Engineering and Equipment

The Engineering, Equipment and Materials Exhibition is to be held at the Old Horticultural Hall, Vincent Square, Westminster, London, S.W.1, from January 26 to February 9, 1949, inclusive. It was originally planned to hold the exhibition in October this year, but the new dates have finally been decided upon as being most suitable for exhibitors and overseas buyers.

Turkey's Bid for Industrial Sufficiency

State Plans to Expand Electricity, Steel and Chemicals

OF the three five-year plans initiated in Turkey, to foster research and industrial development, the first two were largely inoperative because of the war and other factors. The third began in 1946 and serious attempts are being made to implement it fully despite many difficulties. It will include practically the whole industrial field, although certain sections, such as textiles, power stations, iron, steel, coal, and cement will have some priority. A sum of £T.600 million has been allocated, and it is hoped to supplement this from American credits and advances from the International and Export-Import banks.

Expenditure on Transport

Much of the £T.600 million has, in fact, already been expended on transport and other basic needs. Expenditure is mainly in the hands of the State through the Sumer and Eti banks. The former controls the iron, cement, sugar, chemical and allied industries, while the Eti bank looks after mining operations—chrome ore, iron, oil-shale, pyrites and copper, also electrical plant and power stations. Mineral prospecting is in the hands of another State institution, the M.T.A. Bank. The following summary is based chiefly on an interesting report by Dr. W. v. Haken. (*Angew. Chem.* 1948, 20, B, 145-147.)

Ambitious schemes had been envisaged for the heavy chemicals industry in the earlier plans, but the scale has had to be somewhat reduced. Schemes include nitrogen fixation for ammonia, nitric acid, etc., in Kütahya, with a capacity of 30-40,000 tons per annum, presumably in terms of nitrogen; alkali electrolysis at Izmit (Sea of Marmora) for caustic soda (6000 tons), and a new soda factory in Istanbul (20,000 tons); sulphuric acid in two factories at Karabük and Ankara, by the contact process, also a third (lead chamber) plant in Istanbul; tar products at Karabük; insecticides, including DDT soap and cosmetics, sulphur, rubber goods. Some of these are already old established, others are only in the discussion stage.

The iron and steel industry is centred in Karabük, where some of the plant was installed by an English firm during the first five-year period. These are to be extended at a cost of £T.8 million and output of cast iron raised to 160,000 tons per annum and of steel to 200,000 tons, thus supplying about half the home require-

ments. Although plant and equipment are of the most modern design it is not well situated in respect to ore and coal supplies, so that production costs are thereby increased. However, in the interests of autarchy, and possibly of military defence, they must be maintained at any cost.

Some coal mines are situated at Zonguldak, on the Black Sea, in the neighbourhood of a large power station, and, with the aid of American equipment, are to be intensively developed. Coal output increased to 4 million tons in 1946, and is to be raised to 8 million tons per annum. The present small export trade in coal it is also hoped to enlarge. The coal mines, like the iron and steel works, are said to be running at a loss, under State control. Cement is made principally in the Sivas district, where four factories produce about 400,000 tons per annum—about two-thirds of the home demand. The Sumer Bank has decided to erect two more cement works so that the need for imports may be eliminated. It is hoped to obtain some equipment from the British zone in Germany.

Power stations, of course, occupy an important place in the plan. Two, at least, are under construction, and three more are proposed. One, as already stated, is near the Zonguldak coal mines—the Catalaghi station—and will supply with power the Karabük iron and steel works and other users. It was hoped that, this year, capacity available would reach 120,000 kW., and that eventually the output figure would be 250 million kWh per annum.

Fuelling with Shale Oil

The Tuncilek power station, now under construction, will be fuelled with shale oil or derivatives. Its output by 1950 should reach 80,000 kW, and users will include mines at Tuncilek, a nitrogen fixation factory, and cellulose works in Izmit, as well as the town of Istanbul for lighting, etc. Three hydro-electric schemes have been proposed on the rivers Sakarye, Kadinçik, and Sariyar, with outputs respectively of 150, 150, and 440 mill. kWh.

Sugar production from beet occupies several small works in Alpula (Thrace), Eskişehir, near Kütahya, and Turhal. These are fairly modern and well equipped, with total output of 100,000 tons per annum, or a little short of home requirements. Some extension is proposed, including cane sugar from Adana plantations;

AMERICAN AID FOR SCIENCE

More Equipment for European Workers?

DR. KARL LARK-HOROVITZ, general secretary of the American Association for Advancement of Science, recently returned from a two-month visit to Europe, where he toured laboratories in Great Britain, Sweden, Denmark, Switzerland and Holland. Dr. Lark-Horovitz has stated in the U.S.A. that the Marshall Plan can prove of great value to scientists in Europe by enabling them to import scientific equipment.

Although scientific research was recovering from effects of the war, he said, there were still a number of handicaps to be overcome, including fuel shortage, lack of equipment, of textbooks and of teachers. It would be beneficial to European scientists if the United States could send them some of our surplus micro-waves equipment, widely needed in purely academic research in structure of molecules, atoms and nuclei.

"I am full of admiration for the work being done in Europe today, especially in Denmark, Holland and England," he said. "I was impressed with the excellence of their research and their enthusiasm despite their many hardships and restrictions. Research being carried on in Great Britain is one of the most exciting of all scientific centres today. In all English laboratories there is not only a great deal of research work going on, but it is work of the highest quality."

Emphasis in scientific research throughout Europe, he reported, is on precision work such as electronics, new photographic techniques as applied to nuclear physics, and physical measurements as applied to various fields. Both the Netherlands and Denmark, he found, carried on research devoted to modern theoretical physics during their occupation in spite of many difficulties.

"Another development in Europe that amazed me," he declared, "was the tremendous activity and interest in international scientific conferences, at which scientists from all over the world participated."

A native of Vienna and a graduate of the university there, where he specialised in physics and physio-chemistry, Dr. Lark-Horovitz has been with the physics department at Purdue University since 1928. He is credited with outstanding work in the fields of X-rays, crystal structures, nuclear physics and radioactive tracers.

\$4.4 Million of Chemicals

Total grant authorisations approved by the United States Economic Co-operation Administration for European Recovery Programme countries and for China, now total almost 1500 million dollars. France has so far received the largest amount, with the United Kingdom second, and Italy third.

Of the goods approved for Britain up to the end of August, food and agricultural items represented 64 per cent. Among the industrial items the following allocations (in million of dollars) are of interest: non-medical chemicals and related products 4.4; pulp and paper 5.5; non-ferrous metals 32.5; iron and steel mill products 3.3; iron and steel mill products 3.3; petroleum and products 4.4.

Authorisations approved for Europe for the week ended September 8 (in millions of dollars) included: Italy 2.9 for copper from Chile; France 5.7 for shelled peanuts from the United States; Bizone Germany 2.3 for electrolytic copper from the United States; Austria 2.1 for sugar from Cuba.

Explosion Tests

300 Tons of Ammonium Nitrate

EXPERIMENTS with 300 tons of ammonium nitrate involving considerable risk are being undertaken by British experts on Dune island, near Heligoland, in an endeavour to prevent explosions of the substance in store or during transport. The research is being undertaken by the Ministry of Supply as a result of the disastrous explosions in 1947 when two ships laden with ammonium nitrate blew up—one at Texas City on April 16, and the other at Brest on July 27. The experiments are being conducted under official auspices, but it is anticipated that some of the findings will become available to industry.

N-F Metal Supplies

No Price Reduction Expected

BELIEF that prices for lead, zinc, and copper would not fall for some considerable time was expressed by metal producers attending the annual convention of the American Mining Congress in San Francisco. In London, final allocations of tin metal for the second half of 1948 amounting to 11,980 tons have been made by the Combined Tin Committee. Together with allocations previously announced the total for this period amounts to 43,590 tons, according to the Ministry of Supply. Final allotments in tons were: United States 5120; France 1320; Japan 1170; India 660; Canada 540.

PERSONAL

MR. B. L. METCALF has been appointed chief mechanical and electrical engineer in the production department of the National Coal Board. He is at present technical director of the Brush Electrical Engineering Company, Loughborough, who have agreed to release him for service with the Board from December 1. Mr. Metcalf, who is 47, was educated at Oundle School and Glasgow University, later obtaining an associateship at the Royal Technical College, Glasgow. From 1923 to 1939 he was with Metropolitan-Vickers, Ltd., and for the past five years head of their mining department. He was chief electrical engineer of Powell Duffryn, Ltd., from 1940-1945.

A remarkable record of service was recognised at Stevenston, Ayrshire, last week, when MISS MARGARET MACKENZIE, received a presentation from her fellow-workers on retiring from the I.C.I. factory at Ardeer after 49 years' service. She entered the employment of Nobel's Explosives Company at Ardeer on the day the South African War started, and has trained many girls in the work of the department. She has received all the long service awards offered by I.C.I. Dr. J. W. M'David, chairman of this division of I.C.I., expressed the company's thanks to Miss MacKenzie.

At the annual general meeting of the Irish Chemical Association in Dublin, on September 22, the following officers and council for the 1948-49 session were elected: President, Prof. T. S. Wheeler; vice-president, D. Crowley; hon. secretary, G. F. O'Sullivan; hon. treasurer, J. G. Belton. Council: Messrs. V. C. Barry, T. G. Brady, Prof. W. Cocker, Prof. T. Dillon, Mr. W. V. Griffiths, Miss M. MacNeil, Mr. N. V. Nowlan, Mr. F. T. Riley.

SIR CHARLES TENNYSON, C.M.G., secretary to the Dunlop Rubber Company since 1928, has retired as from October 1. He is president of the British Association for Commercial and Industrial Education, chairman of the FBI Education and Industrial Art Committee, and a member of the Council of Industrial Design. He will continue to assist Dunlop's in an advisory capacity.

DR. FRANZ FRANK celebrated his eightieth birthday on September 27. Formerly a professor at the Technical University, Berlin-Charlottenburg, he was also for many years head of an important laboratory engaged on industrial and technological research. Dr. Frank, well-known for numerous publications in the fields of rubber technology,

plastics, benzol and tar products, coal processing and utilisation of asphalt, and wood tar distillation, is still very active and able to give his experience and advice to Franks Laboratories, Ltd., which he helped to found.

MISS W. G. KEEPE, appointed to a Wellcome Pharmaceutical Research Fellowship a year ago, has been awarded the Fellowship for a second year at Manchester University, where she has been carrying out whole-time research on penicillin. A second Fellowship has been awarded to MR. D. W. WYLIE at Glasgow University where he is engaged in pharmacological research. The Fellowships are for £350 a year.

SIR FREDERICK BAIN had conferred upon him, by King Frederik of Denmark, the Order of Dannebrog, after the opening of the British Exhibition in Copenhagen, which closes tomorrow (October 3).

MR. ALBERT HOWARTH, lecturer in textile chemistry at Manchester College of Technology, has been elected by the council to associateship of the Textile Institute.

MR. A. R. CREW has been appointed publicity manager of Monsanto Chemicals, Ltd.

Obituary

The death has occurred, at his home in Cambuslang, Glasgow, of MR. WILLIAM ROBERT BLAIR, chairman of the British Ironfounders' Association, the British Bath Manufacturers' Association, Ltd., and the National Light Castings Ironfounders' Federation since 1930. His association with the light castings industry dates from his appointment in 1919, as assistant secretary of the National Light Castings Ironfounders' Federation, in which he assumed progressively increasing responsibilities. During the war he served for a time with the Iron and Steel Control.

MAJOR SIR THOMAS CROZIER, who died at Folkestone on Sunday, aged 80, had rendered distinguished service throughout his career as an explosives inspector, and for a long period was Chief Inspector of Explosives at the Home Office, after service as an Army artillery specialist at Woolwich.

The death has occurred at Largs, Ayrshire, of MR. WILLIAM HUTTON CATHCART, of Bishopsbriggs, Glasgow, who for 26 years was a metallurgist with Lobnitz and Co., Ltd., Renfrew. He retired in 1944.

Home News Items

Cheaper Oiticica Oil.—The Board of Trade has announced that from October 1 the price of oiticica oil is to be reduced from £175 to £150 per ton ex store.

I.C.I. to Distribute Furfural.—As from October 1, Imperial Chemical Industries, Ltd., will act as sole selling agents in the United Kingdom for furfural produced in the U.S.A. by the Quaker Oats Co., of Chicago.

Houses for Key-workers.—In view of the proposal to erect houses for key-workers in the Skelmersdale area, C. T. Brock and Company (Crystal Palace) Fireworks, Ltd. are planning to establish a factory at White Moss, Skelmersdale.

Auxiliary Power Needed.—The Ministry of Fuel asks industrial and other undertakings which own auxiliary electrical generating plant to use it to relieve the public supply at least during the hours 8 a.m.—12 noon and 4—5.30 p.m. from the beginning of this month to the end of March.

Steelworks Rescue.—When two steeplejacks dismantling a 200 ft. chimney were overcome by fume gas, five steelworkers at the Redbourne Steel Works, Scunthorpe plant of Richard Thomas and Baldwin, Ltd., climbed to them by the iron ladder and lowered the unconscious steeplejacks by ropes.

Argentina Steel Order for Britain.—An order valued at £6 million has been placed by the Argentine Government with British steel rail makers. The order for 250,000 tons of steel rails and fish plates is to be delivered over six years. Firms on the north-east coast of Scotland and South Wales will benefit.

Coal Output up 80,000 Tons.—The total coal output last week was up by 80,000 tons on the previous week. The figure of 4,125,600 tons, however, is still well below the target tonnage which on the week represents 50,900 more tons. Last week's total compares with 3,897,700 tons in the week ended September 27, 1947.

New Glucose Prices.—The Minister of Food has made the Glucose (Control and Maximum Prices) Order, 1948, to replace that of 1943. The new order, which comes into effect on the 10th of this month, provides for an increase of 14s. per cwt. in the first hand selling price of liquid glucose following the recent increases in prices charged to glucose manufacturers for maize and maize starch.

Change of Address.—Ainsley (Industrial Instruments), Ltd., has moved from South Norwood to North Circular Road, West Twyford, N.W.10.

New Telephone Service.—Telephone service with Iran (at present limited to Teheran) has been opened and is available from 6.30 to 8.30 a.m. GMT daily, except Fridays and Sundays. Charge for a call of three minutes is £3.

Research Chemist Found Dead.—Mr. Peter George Carter, research chemist of I.C.I., Blackley, Manchester, was found dead near his home, Alkington, Middleton, on September 20. A phial of liquid and a note were also found.

Reduced Price of Liquid Rosin.—The Board of Trade has announced that, as from October 1, 1948, the selling price of liquid rosin distributed through the agency of the Liquid Rosin Importers' Association, Ltd., will be reduced by £6 per ton, to £32 per ton ex United Kingdom warehouse.

Census of Distribution.—The Board of Trade has now made an order fixing 1950 as the year in which the first full Census of Distribution will be taken. It will be compulsory, will be taken early in the year in respect of the year 1949 and will involve wholesalers, retailers and other services.

Telephone Apparatus for Export.—More than two-thirds of the telephone apparatus and cables being made in this country are taken by orders overseas. Most of the remainder is used to serve public utility and health services, export industries, food producing and other essential needs, states the G.P.O.

Awards for Enterprise.—Sums totalling £486 have been awarded by the Post Office during the quarter ended June 30, 1948, to members of the staff in respect of 197 suggestions submitted for improving the services. Since 1906, when the scheme was introduced, more than 125,000 suggestions have been received and over £40,000 paid in awards.

Lead Mining Revival.—An attempt to revive the lead mining industry on a co-operative basis is being made by 100 men at Wirksworth, Derbyshire. It is proposed to establish a corporation to operate a machinery pool and centralised pumping plant, seek cheap power and rates remission during development work, and build a central lead treating plant to handle the output of small mines economically and avoid too many spoil dumps.

Overseas News Items

Czech Iron and Steel Figures.—Czechoslovakia produced in the first half of this year 1,323,153 tons of raw steel, over 920,000 tons of rolled products and over 810,000 tons of pig iron.

German Lead Mines.—After being idle for three years, the Mechernich works at Eifd, the oldest lead mines in Germany, have recently resumed operations. An annual output of 7000 tons is expected to be reached by the end of the year.

Norway-Czechoslovak Trade.—Fish oil zinc, carbide, casein and industrial chemicals are to be shipped by Norway to Czechoslovakia under a recent trade agreement. Return shipments of glass, machinery, foundry products and textiles have been stipulated.

Chinese Metal Exports.—The total value of all metals and ores exported from China in the first quarter of 1948 amounted to 2,729,000 dollars. Exports included: wolfram concentrates 2192 tons; tin ingots and slabs (principally from Canton) 801.6 tons. Shipments of antimony regulus was 1722 tons.

New Department of Koppers Company.—The Koppers Company, Inc., Pittsburgh, has set up a new chemical section to supervise and co-ordinate engineering and construction work on contracts for the erection of plants to produce oxygen, synthetic fuels, and certain types of chemicals.

Search for Uranium in Colorado.—Attempts are being made to find uranium deposits in the Colorado plateau, states Mr. John K. Gustafson, Director of Raw Materials of the United States Atomic Energy Commission, recently. He described the United States' dependence on foreign sources for uranium supplies as "a source of danger in a troubled world," states a Reuter report from San Francisco.

European Steel Output.—The steel committee of the Economic Commission for Europe records a marked improvement in the European output of steel for the first half of the present year. It was 27 per cent higher than the average monthly production total in the corresponding six months of 1947, and represented 53 per cent of the expected total output for the year. If the present rising production in Europe continues, it is estimated that the year's output will be from 6 per cent to 10 per cent above the target, or 45 million tons of steel instead of the expected 41.5 million tons. This is about 11 million tons more than in 1947.

New Oil Drillings in W. Germany.—Two new oil wells which have recently been drilled in the Emsland, adjoining the Dutch frontier, are reported to have increased West Germany's daily output of crude oil by 200 tons.

Rumanian Mining Developments.—Important deposits of kaolin are reported to have been discovered in Rumania recently. Successful results have also been reported relating to the search for coal in the Jacobeni area.

German Plant for Reparations.—The Deutsche-Messapparate, GmbH., plant for the production of fuses at Hamburg/Langenhorn has been listed as available for distribution by the Inter-Allied Reparation Agency.

Graphite Refining in S. Africa.—After some six years of preliminary work, the South-West Graphite Mining & Refining Co. has recently erected a graphite refining plant near Krugersdorp. This plant is said to be the most modern of its kind at present. It is to be in full operation at an early date.

New Zealand Iron and Steel.—Experimental smelting of the iron sands which abound on the west coast of North island is shortly to be carried out under the auspices of the New Zealand government. It is hoped this may lead to the establishment of an economic iron and steel industry for New Zealand which suffers from a lack of heavy industries.

Pitchblende Found in Canada.—Mr. Brockelbank, Canadian Provincial Minister of Resources, has announced that two Saskatchewan prospectors have discovered "high-grade veins of pitchblende" in the Black-lake area, 400 miles north of Laclaronge, adding that the strike appears to be the "greatest since the Great Bear Lake discovery of 1930."

I.C.I. Merchanting Organisation.—The formation of separate states of India and Pakistan has obliged I.C.I., Ltd., to make changes in the organisation of its interests in that area. As from October 1, 1948, Imperial Chemical Industries (India), Ltd., will cease to trade in Pakistan, Burma and Ceylon. Its existing branches will be transferred to Imperial Chemical Industries (Export), Ltd., who will take over its present organisation in Karachi, Chittagong, Colombo and Rangoon.

COMPANY MEETING

The Distillers Co., Ltd.

Total Investments Representing £50 Million

THE 71st annual general meeting of the company was held in the North British Station Hotel, Edinburgh, on Friday, September 24, when the chairman, Mr. J. Henry Ross, presided.

The chairman said: When I had the privilege of addressing you last year it was in my capacity as deputy chairman, our then chairman, Lord Forteviot, being seriously ill; and, although we all fervently hoped for his recovery, it was not to be, and he passed away on October 24, 1947. His death was a most serious blow to the company, over which he had presided with such dignity and distinction for the previous ten years, and his loss is keenly felt as a peculiarly personal one by every member of the staff from the highest to the lowest.

As is mentioned in the report, my colleagues on the board have done me the honour of appointing me to the vacant chair. While naturally proud of being called to this high office, I am very conscious of the heavy responsibility accompanying such an appointment, and all that it means to follow in the wake of such a long line of distinguished predecessors. It will be my aim, however, to continue to serve the company and the stockholders to the limit of my ability.

Long Service

You will also observe from the report that, since we met last, we have lost the services of another director in the person of Mr. John Nicolson. Mr. Nicolson retired on pension on March 31 of this year, after having given loyal and devoted service over the long period of 38 years. Those of us who were in close, almost daily, contact with Mr. Nicolson appreciated his wise counsel and guidance, particularly in all matters practical, and, while we shall miss him, it is good to know that he has left behind him a trained staff who have been reared in the best D.C.L. tradition.

The appointment by the board of Mr. William Reid as a member of the management committee took place on November 13, 1947. Mr. Reid has spent his entire business life in the trade, and is at present chairman of John Haig & Co., Ltd., as well as chairman of the group Home Sales Committee. The Management Committee will benefit greatly by his wide and varied experience.

Turning now to the statement of accounts,

you will have noticed that these have been prepared in compliance with the requirements of the Companies Act, 1948. The adjusted figures of March 31, 1947, have been entered in the balance sheet and in the consolidated balance sheet for comparative purposes. In the profit and loss account, however, the previous accounting period was for 10½ months with varying accounting periods for the subsidiaries, consequently the figures are not comparable, and, for that reason, have not been inserted.

Profits and Taxes

The manufacturing and trading profits of the company and its subsidiaries, including an item of £406,677 for inter-company profits in the stock valuations of subsidiary companies released during the year, amounted to £11,119,057; to this is added (1) income from investments and interest £905,007, and (2) provision for taxation made in previous years not required and released £597,601, making the total revenue £12,621,665. Income tax and profits tax required the large sum of £6,021,149, and after the necessary provisions, writings off and transfers to general and superannuation reserves made by subsidiary companies as detailed in the report, there was a balance of £4,644,135. The proportion applicable to outside shareholders in subsidiary companies was £339,099, and the undistributed profits of subsidiary companies applicable to the Distillers Company, Ltd., was £684,203 (as against £190,728 retained in this way in the previous accounting period). At this stage, with the amount brought in, there was available £4,388,986, and the board agreed to apply £1 million to general revenue reserve, and to write off premiums and expenses on purchase of debenture stock for cancellation, £156,676, leaving sufficient for the dividends distributed or recommended, and to increase the carry forward from £768,153 to £887,051.

The dividend on the ordinary stock for the year is 1½d. per unit of 4s. which compares with 1s. per unit for the previous 10½-month period. This is in effect a small reduction, but the board has had to have regard to the heavy expansion programme they have authorised. In common with other large companies, your company is feeling the growing drain of heavy taxation, and the increased costs of replacing stocks and other assets. In addition, in the ex-

pansion programme, we face the higher prices for capital assets and the expensive delays in obtaining deliveries of necessary material and equipment. There is no doubt that the ultimate total cost of this programme will prove greater than the estimates, although careful consideration has been given, and is being given, to modifications, where possible, to offset these increased prices.

Reserves and Assets

The company's legal balance sheet calls for comment on the following matters:—

(1) The general capital reserve has increased to £1,132,116 by the transfers thereto of the profit on realisation of certain investments during the year and of recoveries in respect of war damage to properties previously written off.

(2) The revenue reserves total £12,932,545, and it will be noticed that the opportunity has been taken to close certain free reserves by transferring the amounts at credit to general reserve.

(3) During the year, the company purchased for cancellation all but £19,400 of the debenture stocks. As I mentioned before, the premium and the expenses of purchase have been written off out of revenue.

(4) Under the heading of fixed assets, lands and buildings and plant, etc., are included at what might be called nominal amounts. For this reason, the directors are satisfied that neither further writings off nor depreciation are required at this time. It has not been found possible to ascertain the original total cost of these assets or of the total writings off and depreciation applied thereto over the past years, and consequently they are inserted at cost, or at cost less sales and amounts written off.

(5) Investments in subsidiary companies now total £23,957,531, a substantial increase of £3,848,641 since the previous date of balance. The main items contributing to this increase are:—

(a) The formation of a new subsidiary called The Distillers Company (Biochemicals), Ltd., to take over the factory at Speke, Liverpool, engaged in the production of penicillin, formerly erected and managed by the parent company as agents for the Ministry of Supply:

(b) The purchase of the business of J. & W. Hardie, proprietors of the well-known "Antiquary" brand of whisky. This business was converted into a limited company, and is being carried on as a subsidiary company:

(c) The securing of a controlling interest

in The Peerless Refining Company (Liverpool), Ltd., manufacturers of margarine, cooking fats, etc., part of which are sold to The United Yeast Co., Ltd., for its bakers' sundries trade:

(d) The acquisition of the total issued ordinary shares of The Manchester Chemical Co., Ltd., manufacturers of essences, baking powders and other requisites for bakers: and (e) The purchase of the issued share capital in Alexander Bonithrone & Sons, Ltd., maltsters, Freuchie, Fifeshire.

Your directors are hopeful that these investments will prove of real value within the organisation, and will give reasonable yields on the amounts expended.

(6) These new investments, and the increase in current and loan accounts of subsidiary companies have caused a reduction in the company's holdings of British Government securities. At the date of balance, current assets totalled £21,177,738, as compared with £26,365,894 at the previous balancing date.

The consolidated balance sheet shows that capital reserves, revenue reserves and profits unappropriated total £32,753,590. Adding this amount to the issued capital of The Distillers Co., Ltd., we arrive at approximately £50 million as the amount invested in the business as represented by the values at which the assets are stated in the books. It must be borne in mind, however, that, as I have already mentioned, certain of the fixed assets have been written down to practically nominal amounts, while market value of trade investments is, in the aggregate, greatly in excess of book value. Current assets exceed current liabilities by £47 million, but I must point out that the increase in stocks is partly due to replacements at higher prices. It will be noticed that at March 31, 1948, the outstanding commitments for capital expenditure amounted to approximately £1,805,000, but this does not, of course, cover the completion of the expansion programme authorised by the board.

Distilling

When I addressed you last year, the hope was expressed that further distilling licences would be issued to avoid closing down our distilleries, and I am glad to say the industry received authority in December 1947, to purchase an additional 75,000 tons of cereals, which enabled continuity of production to be maintained. Since that time, further negotiations have taken place with the Ministry of Food, and, while full and free production of potable whisky is not yet possible, the Minister of Food, realising the importance of Scotch whisky, not only in the present but in the future economy of

this country, authorised the granting of 150,000 tons of cereals to the industry for the period to April 30, 1949. Licences for that quantity have been issued, and it will be appreciated that this is an important step towards the replenishment of the general stock position. These licences have again been subject to certain conditions regarding the further stepping up of exports to hard currency areas, by reducing the quantity available for the home market, and to which I will refer later in my remarks.

In order to ensure the earliest possible production at our grain distilleries, it was decided to reopen our Caledonian distillery, which has been silent since 1941. The plant, however, has been maintained in working order, and you will be interested to know that production will commence there within the next 10-14 days.

The operating malt distilleries completed their 1947-1948 licences before closing down in the early summer, and I am glad to say a good start has been made with the 1948-1949 season.

Home and Export Trade

Last year, an arrangement was come to with the Ministry of Food in terms of which the proportion laid down for distribution from May 1, 1947, was 3 gallons for export to 1 gallon released for the home market. This arrangement continued in force until April 30, 1948, as from which date a new arrangement with the Ministry became operative.

As a *quid pro quo* for the allocation of further cereals, the Ministry insisted on a still greater increase in exports to hard currency markets, and, in view of the stock position, this could be effected only by our making a further reduction in the supplies available for the home market.

The board view with great regret the present meagre allocation being made to the home consumer, and, as soon as the stock position permits, it will be their desire to bring about some alleviation in this direction. We have always taken the view that a healthy trade at home is a necessary adjunct to our export business, and this factor will not be lost sight of.

During the period under review, the rate of duty has been raised on two occasions. In the supplementary budget, introduced in November, 1947, an increase of 38s. 4d. per proof gallon was made, and again in the Budget of April, 1948, a further increase of 20s. per proof gallon. The rate of duty now amounts to the enormous figure of £10 10s. 10d. per proof gallon, and the retail price of a bottle of Scotch whisky is 33s. 4d., of which 24s. 7d. goes to the Exchequer. Representations were made to

the Chancellor on both occasions, pointing out the penal nature of this taxation. but, so far, without avail.

The board will continue to use every endeavour to bring about some reduction in this fantastic rate of duty.

To all intents and purposes the export trade is under Government direction, and the industry was allotted a target figure to cover shipments to dollar markets, such as Canada, United States of America, South America, etc. In satisfying the needs of the Government for the year ended April 30, 1948, it is gratifying to record that our group companies played a very important part, although, to accomplish such a result, and in accordance with instructions from the Ministry of Food, it meant a drastic cut of supplies to "soft" currency countries as well as to the home trade.

Notwithstanding the difficulties with which our group firms have had to contend, our well-known brands of Scotch whisky continue to occupy a prominent place overseas, and are in constant demand.

Gin

Our gin companies likewise, continue to enjoy an increasing demand for their various brands of gin—Gordon's, Booth's and Burnett's—both at home and abroad. This happy position reflects the very high standard of quality which is consistently maintained by our gin group companies in their brands. By arrangement with the Ministry of Food, particular attention is also being paid to "hard currency" markets.

Yeast

The yeast factories have been working practically to full capacity throughout the year under review to meet the demands for their products in home and overseas markets. I regret that permission has not yet been granted by the authorities to proceed with the new yeast factory in the South of England. In the meanwhile, plans and specifications have been prepared, and the company is keeping in close touch with the appropriate authorities. It is hoped that, within a reasonable period, a start on the erection will be allowed.

Although costs of production of the various products have risen quite substantially over the period, no increases in prices to the consumer have been applied.

Industrial Section

It can be well understood that even greater interest is now being taken by the members and others in the industrial side of the company's business, and particularly so in the

large and important extension programme in chemicals and plastics authorised by the board. It is satisfactory to record that, in general, good progress has been made in all the various sections, and outputs and profits have been well maintained throughout the year. Certain key materials, of which we are large consumers, have remained critically short, but the supply position as a whole has improved. This, we hope, will eventually lead to some degree of relaxation of Government control, and the introduction of normal trading conditions.

Our programme of extensions, to which I have already referred, has been hampered and delayed by shortages of both constructional materials and labour, and there are, as yet, no signs of any improvement in this respect. While this is a great disappointment, it must be emphasised that the directors are satisfied their plans for expansion are based on what they regard as the long term requirements of a stable market.

Subsidiary Expansion

The new plant for our subsidiary, British Geon, Ltd., at Barry, South Wales, which was reported last year as under construction, commenced operations some months ago. The sales of the product "Geon" brand of polyvinyl chloride, are developing well both at home and in certain overseas markets. Adjacent to this factory, we are erecting another for our subsidiary, British Resin Products, Ltd., to take over the expand their existing manufacturing activities now carried on in three smaller units elsewhere.

As I have mentioned, in the year under review negotiations were completed for the purchase from the Government of the penicillin factory at Speke, Liverpool, and this transaction was followed by the formation of The Distillers Co. (Biochemicals), Ltd., with an issued capital of £1 million. Gratifying progress has been made, and the company is now marketing a high grade of crystalline penicillin. Close attention is also being paid to the production of streptomycin, and the development of similar anti-biotic materials.

In the industrial alcohol market, adequate supplies of molasses were available throughout the year, although the price was still very high. On the whole, so far as can be gauged at present, the outlook for this section is more favourable now than it has been for some time.

The directors have given careful consideration to extending the field of research and development, and a very substantial sum, larger than in any previous year, was appropriated for this purpose. Some of the

work is of long term nature, but particular attention is being paid to consumer research, from which the company has derived real benefits in larger outputs and better quality of various materials.

Last year, reference was made to the provisional agreement between the company and the Anglo-Iranian Oil Co., Ltd., to erect a plant at Grangemouth for the production of chemicals from petroleum, and I am glad to inform you that the project has been approved by the authorities. A small company was formed, under the title of British Petroleum Chemicals, Ltd., with a nominal capital of £100. The initial work is now well in hand, and application has been made to the capital issues committee for permission to increase the capital of the company to £5 million, which will be subscribed equally by the two companies. It is not necessary to emphasise the fundamental importance, to the Distillers Organisation, of this association with the Anglo-Iranian Oil Company. The advent of more competitive conditions in the chemical industry should not weaken the position, because the scheme has been designed to fit in with, and to become an integral part of, the existing manufacturing interests of the industrial side of our organisation.

Future Prospects

I am sure you will agree that it is neither possible nor desirable, under present conditions, to forecast very far ahead, but I am able to inform you that, so far as the current year has gone, the margin of profit has been well maintained up to the standard of the year to March 31, 1948. There is the added satisfaction that the conservative policy regularly adopted by the board over the past years, with the ploughing back of substantial amounts out of profits, has placed our company in a strong financial position, with good reserves.

It is anticipated that, in future, dividends on the ordinary stock will be paid twice a year, with the interim in February, and the final in October.

And now, ladies and gentlemen, I cannot close without a word of praise for our staff—a very widely scattered staff, located, not only in Scotland and England, but in Wales and Ireland, and overseas in Canada, Australia, India, South Africa, and in the U.S.A. To each and all, the thanks of the directors are due, and I am sure the stockholders would wish to be associated with this tribute, for, without the devoted efforts of the staff, the satisfactory results now before you would not have been possible.

The report was adopted.

Company News

The Distillers Co., Ltd., has declared a dividend on the preference stock for the six months ending September 30, at the rate of 3 per cent less income tax, payable on November 15. (Company report page 467).

At the close of the 14th annual general meeting of **Follisain Metals, Ltd.**, an extraordinary general meeting was held at which resolutions were passed approving a re-arrangement of the capital structure and the change in the name of the company to **Follisain-Wycliffe Foundries, Ltd.**

The directors of **Imperial Chemical Industries, Ltd.**, announce that they have declared an interim dividend of 3 per cent (actual) in respect of the year ending December 31 on the £50,465,116 ordinary stock already issued on July 20, 1948. The dividend will be payable on December 1.

The annual general meeting of **Powell Duffryn, Ltd.**, will be held on October 27. The directors recommend payment of the following dividend: Ordinary stock, final dividend of 5 per cent actual, less tax, on the £9,660,471 in respect of the year ended March 31, 1948 (making 8 per cent for the year).

New Companies Registered

Emmet Laboratories, Ltd. (459,016).—Private company. Registered September 22. Capital £100. Manufacturers and wholesale and retail dealers in chemicals, drugs, gases, disinfectants, dyes, acids, etc. Directors: Bernard J. Wilkins and Mrs. Dorothy I. Wilkins. Reg. office: 140 Park Lane, W.1.

Soldruff, Ltd. (26,554).—Private company. Registered in Edinburgh September 21. Capital £100. Consulting, analytical, manufacturing and general chemists, etc. Directors: William B. Paton and Mrs. Isabella F. Paton. Reg. office: 54 Kempoch Street, Gourock.

Shadforth, Ltd. (459,001).—Private company. Registered September 21. Capital £100. Manufacturing chemists and dealers in chemicals, gases, drugs, etc. Directors: Wm. Shadforth, Emily H. Shadforth, Marcus W. Shadforth and John Jones. Reg. office: Mitre Works, Cordova Road, Bow, E.3.

Staveley Iron & Chemical Co., Ltd. (459,090).—Private company. Registered September 23. Capital £100. To acquire those parts of the undertaking of the Staveley Coal & Iron Co., Ltd., which have consisted of the carrying on of the business of iron

ore and iron production, ironfounding, the generation of electricity, the manufacture of chemicals, and the ownership and management of housing estates, etc. Solicitors: Linklaters & Paines, 6 Austin Friars, E.C.2. Reg. office: Staveley, Derbyshire.

Chemical and Allied Stocks and Shares

STOCK markets have continued to maintain a steady undertone despite the serious international developments. In fact there was no heavy selling, and although in some instances in the absence of buyers, prices were marked back, declines on balance were mostly small. Recent strength of British Funds, however, was followed by profit-taking in 2½ per cent Consols and Treasury Bonds, while 3 per cent Transport came back to 99.

Chemical and kindred shares were generally steady. Imperial Chemical strengthened to 44s. 9d. with the new shares (20s.) paid at 23s. 7½d. Laporte Chemicals 5s. units were again 20s. 6d., Amber Chemicals 2s. shares were 9s. 6d., and Albright & Wilson 5s. shares 28s. 6d. Fisons changed hands up to 59s. 3d., and helped by the review of the widespread activities of the group given at the annual meeting, the 4s. units of the Distillers Co. were steady at 27s. 6d. Burt Boulton & Haywood have changed hands at 25s., and W. J. Bush marked 80s. Moreover, Monsanto Chemicals 5s. ordinary have held steady at 57s. 6d. at the time of writing. Turner & Newall eased to 75s. 6d., United Molasses to 47s. 1½d., and British Oxygen 98s. 1½d.

Now the Coal Board wishes to acquire coke-ovens, shares of companies with these assets have been a lively market, although in all cases best levels were not held. British Benzol, for instance, were up to 85s. before easing to 81s. 10½d. Monckton Holdings were 49s., Thornclyffe Coal 15s., and Benzol and By-Products strengthened to 7s. 9d. Current market estimates are that these prices are well below break-up values of the shares; but too much reliance should not be placed on these assumptions until details of the offers made by the Coal Board are known. Coalite & Chemical 2s. shares have remained unchanged at 4s. 1½d. because in this case there is no question of "take-over" as the company was assured by Mr. Shinwell when he was Minister of Fuel that it would not be nationalised.

Staveley Coal were again a good feature, strengthening further to 85s. earlier in the week prior to the statements at the annual meeting. Iron and steels, still under the

cloud of expected nationalisation, moved narrowly, and were unresponsive to the great activity in the industry and the implications of rearmament. Colvilles rose to 34s. 9d., however, Dorman Long were 31s. 6d., Guest Keen 48s. 5½d., and United Steel 28s. 4½d. In other directions, Associated Cement changed hands around 71s. 6d., British Plaster Board eased to 24s. 3d., and British Match to 36s. Goodlass Wall were steady at 35s. 6d., as were British Aluminium at 47s. 6d., but Amalgamated Metal eased to 19s. 4½d., and Borax Consolidated came back to 60s. 6d.

British Drug 5s. shares kept firm at 9s. 6d., and Boots Drug were 52s., with Sangers 30s. 1½d., Beechams deferred 18s., and Glaxo Laboratories at £18½. Blythe Colour 4s. shares were 58s. 9d., Greeff-Chemicals Holdings 5s. shares 14s., and A. Boake Roberts 31s. 3d. Oil shares encountered selling, Ultramar falling afresh to 45s., with Shell at 72s. 6d., Anglo-Iranian 7½, and Lobitos 70s. There was no heavy selling, but oil shares are generally very sensitive to any difficult turn in international news. Although it is realised that an increase in the total payment is extremely unlikely in view of dividend limitation, the market is hoping that Anglo-Iranian may decide to bring its interim payment more into line with the final dividend.

British Chemical Prices

Market Reports

THE demand for industrial chemicals continues to be fully maintained as far as home trade is concerned, and the volume of inquiry for export remains on a good scale. The week has not witnessed any important price changes and quotations in most sections of the market are on a firm basis. Reports indicate a slight improvement in the overall supply position but a scarcity of spot offers remains evident among the soda alkalis and for a number of chemicals used in the textile and paint industries. The potash products are also firm on a limited supply position. Acetic acid, acetone and formaldehyde are items for which there is an active demand and there is a fair inquiry for arsenic and hydrogen peroxide. Conditions in the coal tar products market remain fairly active with the home demand absorbing quantities on offer.

MANCHESTER.—New inquiry on the Manchester chemical market during the past week has been fairly plentiful, embracing a wide range of both light and heavy products, and actual replacement buying from the textile and allied trades and other indus-

trial users has amounted to a substantial quantity in the aggregate, with the pressure for contract deliveries fully maintained at around its recent level, especially for the alkali products. Additional inquiries from shippers have been fairly numerous. In the fertiliser trade a fair weight of business for the time of the year is being arranged in superphosphates and other materials, and a brisk demand for most of the light and heavy tar products is reported.

GLASGOW.—In the Scottish chemical market there has been little change during the past week, business having been fairly satisfactory and up to normal for this time of the year. There has been no particularly outstanding demand and coal-tar products have, as usual, been well absorbed. Prices have been stable, and there has been no change worthy of note. In the export market conditions have been a little quieter, but inquiries are still numerous and the number of orders reasonably satisfactory.

LEATHER TRADES CHEMISTS

AT the annual general meeting and conference of the Society of Leather Trades Chemists, held at Leeds University on September 17 and 18, a welcome was extended to visitors and associates from Australia, Belgium, France and the United States. Mr. Derek Bryant, of Australia, handed to the chairman a silver mounted gavel, which, he said, he had brought as a present to the British Society from his country's section, as a mark of esteem and goodwill.

Papers were read, including the following: "Recent Studies of the Chemistry of the Liming Process," by Dr. Joane Bowes; "A New Method of Determining the Acidity in Tan Liquors and its Application to Vegetable Tanning," by Dr. D. Burton; "Recent Studies in Chrome Tanning," by Prof. E. R. Theis (Lehigh University, U.S.A.); "Recent Work on Osmotic Pressures, Membrane Equilibria and Solubility Factors of Proteins in the Light of the Work of Procter," by Mr. G. S. Adair; "Scientific Experience," by Dr. R. H. Marriott; and "Solubility and Other Studies on Quebracho Tanning Extracts," by Dr. T. White.

It was announced by Prof. P. Chambard, as president of the International Union of Leather Chemists' Societies, that the first international congress of the union would take place in Paris in September, 1949.

The "Donald Burton" prize for 1948 was presented to Dr. D. A. Plant for his work on "Some Aspects of Complex Formation in Basic Chromium Sulphate Solutions."

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2 at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Process for the catalytic hydro-forming of naphthas.—C. Arnold. (Standard Oil Development Co.) April 26, 1945. 606,664.

Preparation of ditertiary diamine derived from aniline.—Soc. des Usines Chimiques Rhone-Poulenc. Oct. 18, 1943. 606,665.

Production of synthetic elastomers.—Shell Development Co. June 20, 1944. 606,807.

Production of heterogeneous mixtures of particles adapted for use in heavy-media separation processes.—V. Rakowsky. July 12, 1944. 606,671.

Production of hexanetriol.—Soc. des Usines Chimiques Rhone-Poulenc. July 7, 1943. 606,564.

Preparation of cyanamide.—American Cyanamid Co., and A. H. Stevens. July 25, 1945. 606,568.

Recovery of guanidine salts.—A. H. Stevens. (American Cyanamid Co.) Aug. 8, 1945. 606,901.

Preparation of cyclohexane and alkylated aromatic hydrocarbons.—Anglo-Iranian Oil Co., Ltd., S. F. Birch, J. Habeshaw, and R. A. Lowry. Aug. 9, 1945. 606,811.

Method for obtaining industrially pure double sodium zirconium sulphates.—Soc. des Produits Chimiques des Terres Rares. May 11, 1944. 606,681.

Manufacture of ester-like derivatives of azo-dyestuffs.—Ciba, Ltd. Oct. 6, 1944. 606,814.

Production of polymerisable materials.—I.C.I., Ltd., R. Hammond, and J. W. C. Crawford. Oct. 15, 1945. 606,885.

Process for the production of 2- (amino-alkyl) pyrimidines and derivatives thereof.—Ward, Blenkinsop & Co., Ltd., Howards & Sons, Ltd., A. A. Goldberg, and W. Kelly. Nov. 21, 1945. 606,714.

Process for the production of resin-coated articles.—Shell Development Co. Jan. 8, 1945. 606,697.

Polymerisable materials and polymers thereof.—I.C.I. Ltd., and R. Hammond. Jan. 2, 1946. 606,716.

Polymerisable materials and polymers thereof.—I.C.I., Ltd., R. Hammond, and D. N. Speyer. Jan. 2, 1946. 606,717.

Manufacture of iron castings.—British Cast Iron Research Association, H. Morrogh, and J. Bernstein. Jan. 16, 1946. 606,593.

Manufacture of aliphatic acid anhydrides.—G. E. Smith, and W. Hunter. Jan. 16, 1946. 606,607.

Manufacture of alcohols by hydration of olefins.—W. Hunter. Jan. 16, 1946. 606,608.

Production of cellulose derivatives.—British Celanese, Ltd. Jan. 16, 1945. 606,610.

Manufacture of azo-dyestuffs.—Ciba, Ltd. Jan. 25, 1945. 606,731.

Heat treatment of steel.—I.C.I., Ltd., and T. A. Goskar. Jan. 17, 1946. 606,734.

Process for the manufacture of peroxide compounds by oxidation of amalgams.—N.V. Koninklijke Nederlandsche Zoutindustrie. April 21, 1944. 606,745.

Process for the synthesis of hydrocarbons. C. Arnold. (Standard Oil Development Co.) Jan. 21, 1946. 606,863.

Method of manufacturing thorium.—Westinghouse Electric International Co. Jan. 23, 1945. 606,930.

Moulding polyvinyl chloride pastes.—B.X. Plastics, Ltd., and J. A. Hetherington. Jan. 22, 1946. 606,936.

Extraction of penicillin.—Merck & Co., Inc. Feb. 10, 1945. 606,940.

Process for the stabilisation of organic substances of high molecular weight containing combined halogen.—N.V. de Bataafsche Petroleum Maatschappij. July 12 1944. 606,702.

Manufacture of highly polished polyvinyl chloride sheets and coated fabrics.—I.C.I., Ltd., and W. L. Brogan. Feb. 11, 1946. 606,705.

Manufacture of substantive azo-dyestuffs.—Ciba, Ltd. Feb. 20, 1945. 606,872.

Process for purifying fuel gas.—Koppers Co., Inc. July 1, 1944. 606,624.

Multi-stage centrifugal pump.—Harland Engineering Co., Ltd., and H. H. Anderson. Feb. 20, 1946. 606,947.

Magnesium and magnesium base alloy castings.—Aluminum Co. of America. March 7, 1945. 606,948.

Treatment of fatty acids, and of glyceride oils.—Lever Bros. & Unilever, Ltd. July 7, 1942. 606,711.

Process for the isolation of pentaerythrite from its solutions.—Soc. Des Usines Chimiques Rhone-Poulenc. March 22, 1940. 606,954.

Process of extracting penicillin and product of said process.—Wyeth, Inc. Feb. 8, 1944. 607,122.

Process of obtaining aliphatic sulphonic acids.—Soc. d'Innovations Chimiques. Sept. 28, 1943. 607,204.

Processes for producing substituted acridines.—E. Lilley & Co. April 27, 1944. 607,289.

Preparation of substituted cyanoacetic esters.—Sharp & Dohme, Inc. June 7, 1944. 606,962.

Catalytic hydroforming of naphthas.—J. O. Arnold. (Standard Oil Development Co.) June 12, 1945. 606,964.

Preparation of esters of alpha-formylphenaceturic acid and compounds formed therefrom.—Lederle Laboratories, Inc. June 13, 1944. 606,965.

Process for producing steel with a low nitrogen content in the converter.—Soc. Anon. J. Cockerill. March 13, 1943. 607,209.

Manufacture of carbon black.—Phillips Petroleum Co. Dec. 3, 1943. 607,296.

Methods for the oxidation of saturated aliphatic hydrocarbon gases.—Clark Bros. Co., Inc. Aug. 9, 1944. 606,967.

Manufacture of sulphuric acid leuco esters of anthraquinone azo-dyestuffs.—Durand & Huguenin A.G. July 23, 1945. 607,219.

Manufacture and use of phenoxyethylammonium compounds.—Ciba, Ltd. Nov. 24, 1944. 607,222.

Manufacture of hydrophenanthrene carboxylic acids and derivatives thereof.—Ciba, Ltd. Nov. 30, 1944. 607,134.

Prism spectro-meters.—American Cyanamid Co. March 21, 1945. 606,976.

Production of ammonium sulphate.—I.C.I., Ltd., and K. Gordon. Dec. 12, 1945. 607,231.

Butadiene-styrene copolymer.—Wingfoot Corporation. Oct. 2, 1945. 606,980.

Process for the production of isoprene by distillation of rubber.—Rubber Stichting. April 6, 1943. 607,233.

Process for the preparation of gel particles.—C. Arnold. (Standard Oil Development Co.) Jan. 15, 1946. 607,234.

Manufacture or production of steel or alloy steel strip.—Birlec, Ltd., and P. F. Hancock. Jan. 23, 1946. 606,996.

Penicillin manufacture.—I.C.I., Ltd., and T. Leigh. Jan. 23, 1946. 607,004.

Preparation of riboflavin.—Glaxo Laboratories, Ltd., and W. B. Emery. Jan. 23, 1946. 607,008.

Production of chemical compositions containing lead dioxide.—Dunlop Rubber Co., Ltd., and M. Goldstaub. Jan. 24, 1946. 607,044.

Production of fatty acids and fatty alcohols.—Bamag, Ltd., M. K. Schwitzer, and W. Williams. Jan. 24, 1946. 607,064.

Cellulose ester or ether fibres.—H. C. Olpin, W. B. Miller, and S. A. Gibson. Jan. 25, 1946. 607,085.

Production of organic fluorine compounds.—E. I. du Pont de Nemours & Co., and G. W. Rigby. Jan. 25, 1946. 607,103.

Phenol formaldehyde condensation resin.—I.C.I., Ltd., and T. J. B. Arthur. Jan. 25, 1946. 607,104.

Accelerators for the vulcanisation of natural and synthetic rubber.—Monsanto Chemical Co., and M. W. Harman. Dec. 6, 1944. 607,111.

Antibiotic substances and processes of preparing same.—Merck & Co., Inc. Feb. 9, 1945. 607,186.

Methyl siloxanes and methods of preparing them.—Corning Glass Works. Feb. 14, 1945. 607,253.

Process for catalytically dehydrogenating hydrocarbons.—Universal Oil Products Co. Feb. 11, 1942. 607,256.

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Metalliferous Mining in Britain

ATTENTION has been called on numerous occasions to the heavy inroads that have been made during this historically brief industrial age on the world's known reserves of minerals. The British Association had something to say upon that theme, and it appears that it may be necessary to consider methods of conservation of metals and other rarer elements on the one hand, and to take every possible opportunity of efficiently mining all known reserves on the other. There are certain sources of materials which appear to be virtually inexhaustible, but, excepting water and air and possibly some rocks such as limestone, it is difficult to name any that are likely in fact to prove adequate to meet the existing industrial demands for another two or three centuries. A time will come when scientists will have to review what sources of raw materials remain, and direct their work to securing the essentials of daily life using those substances as starting points. Life would be very different had we no steelworks, no non-ferrous metals to speak of, no coal mines, no petroleum, as may well be the case 1000 years from now: and many other materials on which we now rely may well have failed us long before then. We can be sure of water, or air, of rocks beneath the surface of the earth. Silica and a few other oxides will always be available; but whether we can extract other useful compounds at a reasonable cost is another matter. Chemistry, there-

fore, may well be devoted in the future to devising new materials from those that will remain abundant and to perfecting efficient and not too costly methods of isolating such elements as we cannot do without from rocks in which they are contained in very small amount, or from the sea.

It is doubtful if local government authorities in Britain have made any extended study of this problem. They may be actuated by a laudable sense of patriotism, of helping the country to produce at home things for which we must now pay in foreign currency. They are fairly certainly glad to see a chance of adding to the rateable value of their districts in order to finance schemes of social betterment. Whatever are the motives, there has lately been renewed activity of this kind, including the announcement that local authorities in Derbyshire are now pressing the Government to sponsor new mining ventures. The local enthusiasts, remembering the county's lead lodes and its past history of mining, take the view that there is still a great deal of unmined lead in Derbyshire.

Basically, the idea should appeal to the theoretical economist; if lead is present in any considerable quantity in this country, let us be active in getting it. In practice, the idea requires careful consideration. We have seen certain outstanding examples of the widespread desecration wrought by Ministers of Fuel and Power in their plans

On Other Pages

Leader :		<i>Demand for Technical Services</i> ...	482
<i>Metalliferous Mining in Great Britain</i>		<i>Chemical Firm's Centenary</i> ...	482
		<i>£3,195,000 for Petrochemicals</i> ...	482
Notes and Comments :		<i>Industrial Uses of Silicon Tetra-chloride</i>	483
<i>Curtain Raisers</i>		<i>Expanding Technology of Spot Welds</i>	484
<i>A Disappointing Document</i> ...		<i>Metal Coating Reviews</i>	484
<i>Preventing Industrial Emigration</i>		<i>Study of Ash Fusibility</i>	485
<i>Post-Graduate Lectures</i>		<i>Japanese Science and Technology</i> ...	486
<i>Russia and Malaya</i>		<i>Recent Work on Osmotic Pressures</i>	487
<i>Workshop Psychology</i>		<i>World News of Chemical Industries</i>	488
<i>Mission to Czechoslovakia</i> ...		<i>French Chemicals Reviewed</i> ...	488
<i>Steel Nationalisation: Sir S. Cripps on "Security"</i>		<i>Canada's Synthetic Nitrogen</i> ...	489
<i>Paper-Making Development</i> ...		<i>Stamps of Six Nations Dramatise Coal</i>	491
<i>Newsprint Prospects</i>		<i>European Chemicals and Minerals</i> ...	492
<i>The New Mercury Cell</i>		<i>India's Steel and Chemicals</i> ...	493
<i>"High-Pressure" Pig-Iron</i>		<i>Dutch Chemical Progress</i>	494
<i>Penicillin's Action</i>		<i>Technical News and Services</i> ...	497
<i>U.K. Goods for Denmark</i>			

for open-cast mining of coal, much of which is pretty poor stuff. We should not like to let loose any Government production department on the beauty-spots of the country; it is almost axiomatic that metalliferous veins are prone to occur in places of great natural beauty. It is nevertheless worth while making a careful examination of the possibilities still remaining. How much lead is still unmined? Are there derelict mines that could yield reasonable quantities of metal? Are there veins yet untapped that could be worked profitably? These are questions that require very careful examination before fresh workings are started.

One of the difficulties is that development in the past has been haphazard. Private enterprise on so small a scale is apt to be untidy. People dig a shaft and forget to fill it in. People die or become bankrupt and the hole is never filled in, nor is any record kept of where the hole was or why it was abandoned. Not only does this add to the economic difficulties of future mining, but it may be a very serious hazard of country life. Farmers in Derbyshire sometimes find lead mines all over the place, in any field, unknown to themselves or to past owners. This arises from the practice of sinking for lead anywhere under old laws, still unrevoked.

These give to anyone the right to prospect where he wishes, except in public roads, private gardens, churchyards and orchards.

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The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Metalliferous Mining in Britain

ATTENTION has been called on numerous occasions to the heavy inroads that have been made during this historically brief industrial age on the world's known reserves of minerals. The British Association had something to say upon that theme, and it appears that it may be necessary to consider methods of conservation of metals and other rarer elements on the one hand, and to take every possible opportunity of efficiently mining all known reserves on the other. There are certain sources of materials which appear to be virtually inexhaustible, but, excepting water and air and possibly some rocks such as limestone, it is difficult to name any that are likely in fact to prove adequate to meet the existing industrial demands for another two or three centuries. A time will come when scientists will have to review what sources of raw materials remain, and direct their work to securing the essentials of daily life using those substances as starting points. Life would be very different had we no steelworks, no non-ferrous metals to speak of, no coal mines, no petroleum, as may well be the case 1000 years from now; and many other materials on which we now rely may well have failed us long before then. We can be sure of water, or air, or rocks beneath the surface of the earth. Silica and a few other oxides will always be available; but whether we can extract other useful compounds at a reasonable cost is another matter. Chemistry, there-

fore, may well be devoted in the future to devising new materials from those that will remain abundant and to perfecting efficient and not too costly methods of isolating such elements as we cannot do without from rocks in which they are contained in very small amount, or from the sea.

It is doubtful if local government authorities in Britain have made any extended study of this problem. They may be actuated by a laudable sense of patriotism, of helping the country to produce at home things for which we must now pay in foreign currency. They are fairly certainly glad to see a chance of adding to the rateable value of their districts in order to finance schemes of social betterment. Whatever are the motives, there has lately been renewed activity of this kind, including the announcement that local authorities in Derbyshire are now pressing the Government to sponsor new mining ventures. The local enthusiasts, remembering the county's lead lodes and its past history of mining, take the view that there is still a great deal of unmined lead in Derbyshire.

Basically, the idea should appeal to the theoretical economist; if lead is present in any considerable quantity in this country, let us be active in getting it. In practice, the idea requires careful consideration. We have seen certain outstanding examples of the widespread desecration wrought by Ministers of Fuel and Power in their plans

On Other Pages

Leader :	<i>Demand for Technical Services</i> ...	482
<i>Metalliferous Mining in Great Britain</i> ...	<i>Chemical Firm's Centenary</i> ...	482
<i>Notes and Comments :</i>	<i>£3,195,000 for Petrochemicals</i> ...	482
<i>Curtain Raisers</i> ...	<i>Industrial Uses of Silicon Tetrachloride</i> ...	483
<i>A Disappointing Document</i> ...	<i>Expanding Technology of Spot Welds</i> ...	484
<i>Preventing Industrial Emigration</i> ...	<i>Metal Coating Reviews</i> ...	484
<i>Post-Graduate Lectures</i> ...	<i>Study of Ash Fusibility</i> ...	485
<i>Russia and Malaya</i> ...	<i>Japanese Science and Technology</i> ...	486
<i>Workshop Psychology</i> ...	<i>Recent Work on Osmotic Pressures</i> ...	487
<i>Mission to Czechoslovakia</i> ...	<i>World News of Chemical Industries</i> ...	488
<i>Steel Nationalisation: Sir S. Cripps on "Security"</i> ...	<i>French Chemicals Reviewed</i> ...	488
<i>Paper-Making Development</i> ...	<i>Canada's Synthetic Nitrogen</i> ...	489
<i>Newsprint Prospects</i> ...	<i>Stamps of Six Nations Dramatise Coal</i> ...	491
<i>The New Mercury Cell</i> ...	<i>European Chemicals and Minerals</i> ...	492
<i>"High-Pressure" Pig-Iron</i> ...	<i>India's Steel and Chemicals</i> ...	493
<i>Penicillin's Action</i> ...	<i>Dutch Chemical Progress</i> ...	494
<i>U.K. Goods for Denmark</i> ...	<i>Technical News and Services</i> ...	497

for open-cast mining of coal, much of which is pretty poor stuff. We should not like to let loose any Government production department on the beauty-spots of the country; it is almost axiomatic that metalliferous veins are prone to occur in places of great natural beauty. It is nevertheless worth while making a careful examination of the possibilities still remaining. How much lead is still unmined? Are there derelict mines that could yield reasonable quantities of metal? Are there veins yet untapped that could be worked profitably? These are questions that require very careful examination before fresh workings are started.

One of the difficulties is that development in the past has been haphazard. Private enterprise on so small a scale is apt to be untidy. People dig a shaft and forget to fill it in. People die or become bankrupt and the hole is never filled in, nor is any record kept of where the hole was or why it was abandoned. Not only does this add to the economic difficulties of future mining, but it may be a very serious hazard of country life. Farmers in Derbyshire sometimes find lead mines all over the place, in any field, unknown to themselves or to past owners. This arises from the practice of sinking for lead anywhere under old laws, still unrevoked.

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MISSION TO CZECHOSLOVAKIA

Cordial Reception to ABCM Delegates

THE goodwill mission of the Association of British Chemical Manufacturers which went to Czechoslovakia at the invitation of the Czechoslovak nationalised chemical industries has returned with a kaleidoscope of memories, mostly happy and many of them quite unconnected with chemicals. Summarising the impressions of a motor trip of nearly 2000 miles and visits to eight chemical works, the ABCM records: "A memorable mission on which was showered everything that could contribute to its interest, comfort and well-being—unbelievable kindness, courtesy, hospitality and goodwill never to be forgotten."

Plants Visited

The report indicates that the English party missed little of the dramatic beauty of the country or of the scope of the extreme economic experiment in progress there. Among the principal chemical undertakings visited were the chemical factory at Novaky, which is to become the centre of the country's acetylene industry; the imposing dyestuffs works at Rybitvi and the rayon plant at Neratovice; the 100-year old soapworks at Schicht, "a model of construction and efficiency," and, largest of all, the Stalin works at Most, which the occupying Germans built to yield over one million gall. of motor spirit annually, a plan which the bombs of the RAF abruptly

ended. It is now in course of being re-stored.

"Czechoslovakia"—says the ABCM summary—"is working hard to rebuild its economy. The nationalisation of the big industries and the banks in 1945 was the first step and was done with the general approval of the populace and apparently rightly so in the very special circumstances."

"Then in 1946, they embarked on a Two-Year Plan, primarily of reconstruction, to bring up productivity to about 10 per cent. over the 1937 level without serious capital expenditure, except in agricultural Slovakia, where a development scheme had to be pursued in the interests of that territory. This plan, now nearing its end, is claimed to have achieved its objectives, the chemical industry having exceeded its target by 8 per cent."

"Now a Five-Year Plan is being formulated and the details should be completed soon. The aim was said to be to increase consumption per head by about 60 per cent. as compared with pre-war and the national income by 40-50 per cent. In particular, the heavy machinery industry is due for the largest expansion of some 200 per cent. This is about three times what is planned for the chemical industry."

"For this plan, an addition of a quarter of a million workers to the present industrial force of 1.4 million is likely to be needed; this can come only from the land."

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Paper-making Developments

The Use of Synthetic Resin

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A new technique of paper making has now been evolved under the comprehensive research programme of the U.S. National Bureau of Standards. The development of a synthetic resin, melamine formaldehyde, imparting unusual strength, enables many deciduous woods (such as maple, beech, birch, or poplar), which have formerly been considered only as "fillers," to be fully utilised.

Technically, paper is a felted sheeting of vegetable fibres, formed on a screen from a water suspension of the fibres. In the conventional method, fibres are prepared for fabrication by mechanical beating in water. Beating causes the fibres to absorb water and form a gel-like film on their surfaces by a structural change (hydration); this bonds the fibres and gives the paper its strength. The beating process necessary to provide this bonding also causes some of the troublesome behaviour of paper in printing, such as high expansion, excessive curling, slow oil absorption, etc. The new process substitutes synthetic resin bonds between the fibres for the gel-like bonds formed by hydration. The resin bonding gives a maximum strength with less beating and produces a superior paper by eliminating the adverse effects of hydration.

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MISSION TO CZECHOSLOVAKIA

Cordial Reception to ABCM Delegates

THE goodwill mission of the Association of British Chemical Manufacturers which went to Czechoslovakia at the invitation of the Czechoslovak nationalised chemical industries has returned with a kaleidoscope of memories, mostly happy and many of them quite unconnected with chemicals. Summarising the impressions of a motor trip of nearly 2000 miles and visits to eight chemical works, the ABCM records: "A memorable mission on which was showered everything that could contribute to its interest, comfort and well-being—unbelievable kindness, courtesy, hospitality and goodwill never to be forgotten."

Plants Visited

The report indicates that the English party missed little of the dramatic beauty of the country or of the scope of the extreme economic experiment in progress there. Among the principal chemical undertakings visited were the chemical factory at Novaky, which is to become the centre of the country's acetylene industry; the imposing dyestuffs works at Rybitvi and the rayon plant at Neratovice; the 100-year old soapworks at Schicht, "a model of construction and efficiency," and, largest of all, the Stalin works at Most, which the occupying Germans built to yield over one million gall. of motor spirit annually, a plan which the bombs of the RAF abruptly

ended. It is now in course of being restored.

"Czechoslovakia"—says the ABCM summary—"is working hard to rebuild its economy. The nationalisation of the big industries and the banks in 1945 was the first step and was done with the general approval of the populace and apparently rightly so in the very special circumstances.

"Then in 1946, they embarked on a Two-Year Plan, primarily of reconstruction, to bring up productivity to about 10 per cent. over the 1937 level without serious capital expenditure, except in agricultural Slovakia, where a development scheme had to be pursued in the interests of that territory. This plan, now nearing its end, is claimed to have achieved its objectives, the chemical industry having exceeded its target by 8 per cent.

"Now a Five-Year Plan is being formulated and the details should be completed soon. The aim was said to be to increase consumption per head by about 60 per cent. as compared with pre-war and the national income by 40-50 per cent. In particular, the heavy machinery industry is due for the largest expansion of some 200 per cent. This is about three times what is planned for the chemical industry.

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"High-Pressure" Pig-Iron

Production Claims for U.S. Process

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While not divulging the cost of conversion, understood to be very much less than the cost of erecting a new furnace, the company estimates that use of the pressure-blowing method will yield the equivalent output of about one new blast furnace that ordinarily would cost between \$10-12 million.

Apart from increased production, advantages cited by the company for the new technique include efficiency in burning coke, more uniform quality iron, less flue dust, and an alleviation of the critical shortage of metal for the steel industry.

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In the new process the furnace is partly sealed by a system of valves to retain the hot gases. These valves cause the incandescent atmosphere within the furnace to build up a very high pressure which permits the production of higher temperatures in much shorter time.

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The Danish Government announces that it has agreed to grant import licences for goods displayed at the British Exhibition in Copenhagen up to a value of £270,000. This means that many exhibitors will be enabled to save the cost of sending the goods back to Britain. Half a million people passed through the turnstiles during the first week of the exhibition. It is not, however, possible to record separately the visits of trade buyers, but some 16,000 season tickets were bought by business firms in Denmark, Sweden, Norway and Finland before the exhibition opened.

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Demands on Powell Duffryn Unit

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Offspring of the Gas Industry

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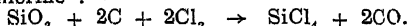
INDUSTRIAL USES OF SILICON TETRACHLORIDE

Wide Scope for Further Research

by H. G. EMBLEM and G. E. STOCKWELL

SILICON tetrachloride was one of the first silicon compounds to be prepared, being obtained by Berzelius¹ in 1824, by the direct chlorination of silicon. The reaction used by him is still the principal manufacturing method. Frequently in commercial practice ferrosilicon is used as a substitute for silicon.

An alternative preparative method is the reaction of a mixture of sand and coke with chlorine² :—

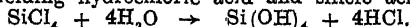


Many suggestions have been put forward to render this process economically workable. The chlorination of silicon carbide has also been suggested as a manufacturing method for silicon tetrachloride³.

Technical silicon tetrachloride contains, as its principal impurities, dissolved chlorine gas, together with the higher silicon chlorides. The chlorine may be removed by refluxing and the higher silicon chlorides by fractional distillation.

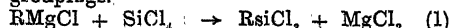
Silicon tetrachloride is a colourless, mobile, volatile liquid, miscible with most inert solvents. It boils at 57.5°C., at normal atmospheric pressure, and is heavier than water. The vapour is unassociated, as it has a normal vapour density.

Chemically, silicon tetrachloride possesses the typical properties of a non-metallic chloride. It is readily hydrolysed by water, yielding hydrochloric acid and silicic acid.



This is in marked contrast to carbon tetrachloride, which is only hydrolysed by caustic soda solutions.⁴ In several of its reactions silicon tetrachloride may be compared with an alkyl monochloride. It undergoes a similar Wurtz-Fittig reaction, and reacts similarly with a Grignard reagent. By methods utilising these reactions it is possible to introduce organic groupings, resulting in the organo silicon compounds. It is upon such reactions that the principal uses of silicon tetrachloride are based.

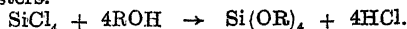
The reaction of silicon tetrachloride with a Grignard reagent results in stepwise replacement of the chlorine atoms by organic groupings.



This reaction was first investigated by Kipping⁵ in 1904, and opened up an entirely

new field of research, which led to the industrial development of the silicone polymers. These polymers are prepared by the hydrolysis and condensation of mixtures of organo silicon halides.⁶

Silicon tetrachloride will react with hydroxylated organic compounds to give derivatives of silicic acid—the "silicon esters."



This reaction has assumed considerable importance with the growing technical utilisation of the silicon esters. In Great Britain silicon tetrachloride is reacted with industrial methylated spirit (64 O.P.) to give an ethyl silicate containing approximately 40 per cent of silica. The manufacture of silicon esters accounts for most of the British production of silicon tetrachloride.

In addition to its importance as an intermediate in the preparation of organo silicon compounds, silicon tetrachloride is now finding increasing use as an industrial chemical in its own right. Dilute solutions in an inert, low boiling organic solvent have been suggested as anti-shrink agents for wool,⁷ and as treatments for reducing the surface reflectivity of glass.⁸

Textile water repellants may be prepared from silicon tetrachloride by reacting a tertiary amine with the reaction product of silicon tetrachloride; formaldehyde; and a fatty amide. The latter must contain at least twelve carbon atoms.⁹ When mixed with trimethyl chlorosilane, silicone tetrachloride can be used as a water repellent substance for treating ceramic articles, and paper.¹⁰

Silicon tetrachloride may also function as a plastic modifying agent. Coating compositions, having improved durability and weather resistance, may be prepared from low molecular weight phenolic resins treated with silicon tetrachloride.¹¹ Thermoplastics are given increased surface hardness by treatment with silicon tetrachloride and water vapour under reduced pressure.¹² The polymerisation of olefins when carried out in the presence of silicon tetrachloride gives waxlike polymers.¹³

During wartime, in Germany, silicon tetrachloride found a considerable use in the preparation of a finely divided form of silica (K3), of particle size 10-100 milli microns.¹⁴ Ultra fine silica is of considerable interest

(Continued overleaf)

Widening Technology of Spot Welding

New Basis for Determining Absolute Values

FOR the first time in this country it has been possible to put forward recommendations giving the absolute value of each of the main welding variables required for producing optimum results in spot-welding mild steel sheet. The recommendations—which form one of the three principal reports contained in the October number of the Welding Research Supplement of the *Transactions of the Institute of Welding*—are based almost entirely upon actual experimental results obtained by investigators of the British Welding Research Association during the past three years. Much of the experimental data from this work have been published in report form, so that the facts leading up to the recommendations are readily available.

In the past, it has been customary to set spot-welding machines for a given job on a purely arbitrary basis and pay little attention to absolute value of the machine variables. This practice makes it difficult to transfer established settings from one machine to another. Now there are no valid reasons why adequate instrumentation cannot be adopted in production.

The recommendations cover thickness of low carbon mild steel sheet ranging from

20 S.W.G. to 14 S.W.G. inclusive. Additional tests are to be undertaken shortly so that the recommendations will ultimately cover a wider range of thickness, viz., 24 S.W.G. to $\frac{1}{4}$ in. inclusive.

In addition to the information on optimum machine settings, the recommendations put forward actual dimensions of the spot welds obtained and values are given of the order of strength to be expected from spot-welded joints. The question of permissible edge distances is discussed, data are given upon the settings required for spot welding multiple and different thicknesses, and reference is made to the effect of using one electrode of a normal truncated cone shape, with the other electrode of the pad type to preserve surface finish and avoid indentation.

The main recommendations for the optimum values of welding variables, weld strength, weld size, edge distance and pitch are summarised in a single table. Further tables show the effect of changes in each of the variables on weld strength, the increase in secondary current required to maintain weld size at various weld pitches and the effect of edge distance on the failing load of single spot welds.

SILICON TETRACHLORIDE

(Continued from previous page)

in the preparation of phosphors.¹⁵ In World War I much silicon tetrachloride was used for producing smoke screens.¹⁶

At present the physics and chemistry of silicon tetrachloride are by no means fully investigated. The applications described above are not comprehensive, but are intended to illustrate the general principles of its industrial usage. Considerable research and development work must still be undertaken before final assessment of the potentialities of silicon tetrachloride is possible.

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METAL COATING REVIEWS

RUST preventives have been reviewed by Mr. Joseph G. Surchek before the U.S. Iron & Steel Convention. Contributions in the advancement of lowered maintenance in the steel industry are the petroleum base, non-drying protective coatings which are being applied to steel structures to prevent rusting. Difficulties in applying the high melting-point wax-type coatings have been overcome, he said, and it is now possible to apply those materials quickly and effectively by utilising heat and fluid pressure. He maintains that this method is used with equal success on flat surfaces and pipe interiors, according to the application of the coats and to the various atomising equipment which can be used.

The application of zirconium porcelain enamel cover coats at relatively low temperatures directly to the base metal in the manufacture of refrigerator parts will be described to the U.S. Porcelain Enamel Institute annual forum on October 13, at the University of Illinois, by M. E. McHardy, Hussmann Refrigerator Company.

STUDY OF ASH FUSIBILITY

Recent French Research on Combustion of Coal

DURING combustion, e.g., of coal, the ash may be surrounded by either oxidising or reducing gases, and in determining fusibility it is important to stimulate actual conditions as nearly as possible. E. Rousseau, of the Creusot works of Schneider & Co., deals with some of the factors involved and describes suitable apparatus for the tests in *Chim. et Ind.*, 60, August, 1948, pp. 124-136.

In a previous paper (*loc. cit.* 54, 1945, 302-314) he had described the physical constitution of fuel ash and the chief methods used in determining fusibility. Reference is also made to a paper by Bro read at the 3rd Congress on Industrial Heating (*Chaleur et Ind.*, 1934, 1, 37—March).

Prefacing the present article is a discussion of the principal phenomena occurring during coal combustion in ordinary grate furnaces and with powdered coal, and a method is given for determining loss of weight on calcination.

Such loss is practically negligible up to 1000°C. At 1300° it is 4.5-17.4 per cent in the case of fuels of high sulphur content, and it would seem that it is the sulphates that decompose last, either spontaneously or through reaction with certain ash constituents. Among the compounds formed may be calcium ferrates and double silicates of iron and calcium. The best temperature for ash analysis is 900-925°C. and, for fusibility tests, up to 950°C.

Coke Ineffective

In ground ash or slag there is usually a certain amount of unburnt coke which may prove an important factor in calcination temperature and ash fusibility. In the present work, the amount of unburnt was determined in ash calcined at 750°C. and the results were graphed and tabulated. It was shown that the presence of unburnt resulting from imperfect calcination did not greatly affect the fusibility tests, either in a reducing or oxidising atmosphere. Ash to which 5-15 per cent of pulverised coke was added gave in an oxidising atmosphere the same results as samples without such addition.

Production of carbon dioxide occurred only at the surface or periphery of the sample and not in the interior, where there was, accordingly, no reducing atmosphere capable of converting the ferric salts into ferrous. The effect of a preliminary calcination at 950°C. for $\frac{1}{2}$ hour was long tried. This did not affect the fusibility either in a reducing or oxidising atmosphere.

The apparatus used, either vertical or horizontal, was much the same as that in previous work. It is here described and illustrated in some detail, as is the curve recording instrument.

The general conclusions, in addition to those already indicated, are that: the addition of pulverised coke does not produce a reducing atmosphere; it is difficult to know precisely what is the atmosphere enveloping the ash in a grate furnace, and further systematic studies are still necessary; a simple and inexpensive method has been described, useful in all fuel laboratories, for determining the ash fusibility curve in a reducing atmosphere produced by placing a few pieces of coke around the test sample.

At Lower Temperatures

The results show further that the initial temperature in the reaction zone, corresponding with that at which slag first begins to form, is lowered by 40-140°C., and the sinking or subsidence temperature of 50 per cent of the test sample is also lowered by 10-155°C.

So far it has not been possible to trace any definite connection between the refractory quality of the ash and its chemical composition. The ash as a whole may be regarded as a rather complex refractory containing a vitreous phase consisting mainly of ferrous or ferric salts, of which the eutectics melt at relatively low temperatures. If the other constituents have a high refractoriness, such as the aluminium silicates, they keep the material in a viscous state up to very high temperatures.

On the other hand, if the ash contains sufficient of other constituents, themselves capable of producing exothermic reactions, the new products rapidly attain a relative fluidity which is more marked in a reducing atmosphere.

As indicated in a previous memoir, the author has pointed out that the refractory quality of an ash must chiefly depend, other things being equal, on the mineralogical nature of its component parts. If proper analysis could be made of an ash immediately after calcination, exact knowledge of its mineralogical constituents would throw a clearer light on the reactions taking place at the moment of clinker formation.

2200 Years' Service. — A remarkable record was celebrated recently when 61 employees of Lampson Paragon Supply Co., Ltd., whose service totalled 2200 years, were presented with certificates and awards.

Japanese Science and Technology

Chemical and Textile Progress Reviewed

THE development of a number of technological processes of contemporary importance is reported in Summation No. 32 of Non-Military Activities in Japan, issued by SCAP, a copy of which has recently become available in this country. Among these developments, were experiments to determine new uses for a synthetic fibre which is made from polyvinyl alcohol at the daily rate of 200 kg. by the Kurashiki Rayon Co., Ltd.

Polyvinyl acetate is saponified by alcoholic caustic soda, and the resulting solution is spun in a bath containing zinc sulphate and Glauber's salt. The fibre is rendered insoluble by acetylation in the presence of formalin, Glauber's salt and sulphuric acid.

High Chemical Resistance

This new fibre is claimed to have many advantages over other synthetic fibres it is, for instance, resistant to acid, alkali and oil; it is very strong and more resistant to abrasion than ordinary fibres; because of this superior strength, it can be used, in particular, for fish lines and nets.

A process for the production of coke of a quality suitable for large blast furnaces has been developed by the Fuel Research Laboratory of the Japanese Ministry of Commerce and Industry. Indigenous coal which does not yield coke of a sufficiently high calorific value with normal coking processes is used as a raw material. In the new process, which has already reached the pilot plant stage, pulverised coal is mixed with an equal amount of creosote oil and heated to 350°C. for ten hours.

The result is a pitch-like substance, called "Bojuntan" (swelled coal), from which a coke with a high calorific value can be made by the usual high-temperature processes of coke manufacture. Both non-coking and coking coals have been used successfully. The product can be used for blending with light coking coals to supplement the supply of imported coking coal.

In an effort to relieve the critical shortage of caustic soda in Japan, research work on its production by direct electrolysis of sea water is being conducted by the Teikoku Rayon Co., Ltd. Eight small electrolyzers installed by the company at its Iwakuni mill in Yamaguchi prefecture are producing approximately 15 kilogrammes of caustic soda a day.

The purity of the product is reported to be 99.8 per cent, and it is recovered at 15-20 per cent concentration. Chlorine and bromine are obtained as by-products. How-

ever, the process requires 12,000 kW for the production of each ton as compared with 3000 necessary when using the ordinary electrolytic methods, but it is stated that this disadvantage is largely offset by the saving in power, fuel and labour required to produce and purify the salt used in the production of caustic soda.

At the second general sub-committee of the Chemical Industrial Technique Committee for the promotion of Japan's chemical industry, reports were submitted for discussion on soda, dyestuffs, oils and fats, paint, rubber, cement, calcium carbide and cyanamide. The committee's activities included the investigation of methods to improve production technique, the development of not yet used domestic raw materials, the best use of available materials, and the development of new products to overcome shortages and deteriorating standards for dyestuffs and rubber articles.

The report on dyestuffs reveals that research was conducted on the manufacture of dyestuffs intermediates. Standards for the quality control of dyes were determined and submitted for review to the Japanese Industrial Standards Committee. Application was made for obtaining procedures for the manufacture of dyestuffs new to Japan.

Promising Innovations

Of the recent inventions in Japan, the following are believed to offer the best prospects for industrial development:—

The use of waste middle oil (b.p. 250-300°C.) after repeated use in the separation of benzene and heavy oil from coal gas until it possesses no longer any absorbing power, as the basic vehicle for printing ink. The simultaneous manufacture of white phosphorus and phosphate of potash fertiliser accompanied by mixing limestone and potassic feldspar or other potassium containing minerals with phosphate rock, adding a small amount of carbon as a reducing agent. The characteristic feature of this method lies in the use of potassic feldspar in the place of silica in the manufacture of white phosphorus and in obtaining phosphate-potash fertiliser at the same time. The high yield of phosphorus produced is said to be of great purity.

Abstracting is reported to have been completed for the war-time and post-war periods of scientific articles which appeared in the *Journal of the Chemical Society of Japan*. These abstracts have been sent to the United States for publication in *Chemical Abstracts*.

Recent Work on Osmotic Pressures

Professor Procter's Findings Applied in Current Experiments

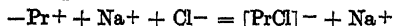
AMONG the papers read at the recent annual conference, held at Leeds, of the Society of Leather Trades Chemists, was one by G. E. Adair, M.A., F.R.S. (Reader in Biophysics, University of Cambridge), entitled "Recent Work on Osmotic Pressures, Membrane Equilibrium and the Generalised Free Energy of Protein Solutions in the Light of the Work of Procter," of which the following is a summary.

Procter's theory of the swelling of gelatin in hydrochloric acid was described by Loeb as one of the most original and ingenious contributions to modern science. The theory gives a remarkably clear and simple account of the large changes in the osmotic pressures of proteins caused by acids and alkalis.

Recent experimental observations on haemoglobin in phosphate buffers show an increase in osmotic pressure in the more acid and the more alkaline solutions, in general agreement with the theory, but the point for minimum osmotic pressure is on the acid side of the pH for minimum combination with acid or base. The difference may be as much as 0.2 pH units for 0.01 molar phosphates and 0.7 units for 0.05 molar phosphates.

Measurements of the membrane equilibrium of ion, if allowance is made for hydration of the protein, indicate that haemoglobin causes relatively small changes in the activities of cations like sodium, potassium or ammonium and relatively large diminutions in the activity coefficients of phosphate and chloride ions.

A reaction of the following type might cause similar changes in ion distribution and osmotic pressure.



—Pr⁺⁺ denotes a protein double ion, [PrCl][−] a protein ion with a combined or associated chloride ion neutralising one positive charge.

Effect of Salts

Although salts tend to diminish osmotic pressure in the range of concentrations studied by Procter and Wilson, they usually increase the pressure in the range where most of the observed pressure is due to the protein itself. This observation might be explained if groups on the surface of the protein molecule can attract either an inorganic ion or a second protein molecule.

If many inorganic ions are present, the chance of attracting a second protein molecule is diminished, and the osmotic pressure should be increased. The effect may be

compared with a diminution in the term ν in van der Waal's equation for gas pressure.

The net excess of salt associated with a protein can be correlated with its solubility and activity.

In studies of the effects of electrolytes on swelling and osmotic pressure of proteins, reproducible results are most readily obtained by the use of relatively large volumes and several changes of the external liquid or dialysate, preferably a buffer mixture with a well defined pH value.

Use of Buffer Mixtures

The chemical potential of salts, acids and water must be the same on both sides of the membrane, in a state of equilibrium. Buffer mixtures can be used to control the potentials in a series of protein solutions in a manner comparable with the control of temperature by a thermostat.

Thermodynamical formulae applicable to dialysed protein solutions may be derived from a function A_g . A revised form of the first definition of this function is stated as follows.

The function A_g termed the generalised free energy of any system is equal to the total energy of the system, minus the sum of all individual forms of energy that include an intensive factor controlled by an external system.

The factors here termed intensive are the temperature T , the pressure with negative sign, symbolises $-P$, ($-P = \delta U / \delta V$) and the chemical potentials. The total energy of a fluid U is regarded as the sum of at least three individual forms of energy, the thermal energy TS , the mechanical energy PV , and the chemical energy $\sum \mu_i n_i$ for substance i . S = entropy of the fluid, V = volume, n_i the number of mols of i , μ_i chemical potential of i .

In fluids with a constant mass of each substance, there are two intensive factors to consider, T and P , four combinations of intensive factors, and four possible values for A_g , equivalent to the well-known functions termed energy, heat content, free energy of Helmholtz and free energy of Gibbs.

If any of the potentials be controlled, an unlimited number of functions of the same type can be obtained by deducting products like $\mu_i n_i$ from the energy. All the functions are special cases of one function A_g , so that methods used in deriving thermodynamic relationships from the well-known functions may be applied to more complex systems, such as dialysed protein solutions, where potentials are controlled.

World News of Chemical Industry

FRENCH CHEMICALS REVIEWED

Recommendations to Implement the Monnet Plan

A STRONG commission has been appointed, under the presidency of M. Etienne, to implement the Monnet Plan for the French chemical industries, with the assistance of about a dozen sub-commissions. The commission's programme and objectives have recently been reviewed by M. Daniel Florentin (*Chim. et Ind.*, 1948, 60, 283-290, September) and following are some of the main features.

Native Alkalis

The alkali section is probably among the most progressive, and is to some extent fortunate in having plentiful supplies of native salines and potash. Production of sodium carbonate reached 472,000 tons in 1946, 600,000 tons in 1947, and has achieved a monthly output of about 60,000 tons so far this year. Exports should soon reach 200,000 tons annually. Caustic soda, too, has shared in the advance, including the electrolytic product in conjunction with chlorine. The glass industry, largely dependent on alkali and fuel, has benefited so far as the former is concerned, although the fuel position, including electric power, is not what it should be. The Alsatian potash mines have resumed full activity, with a monthly output of 70,000 tons K_2O , as compared with 52,000 tons in 1938. This will all be required for home agricultural needs as the fertiliser review shows.

Sulphuric acid production of 100,000 tons per month, has now attained pre-war level. In 1946 it was 846,000 tons, and in 1944, 149,000 tons. Repairs to plant, however, are badly needed. The various processes are exemplified: contact at Paimboeuf, starting with sulphur; and at Port-de-Bouc using pyrites (blendes) and flash roasting; at Miramas (Service des Poudres) gypsum is used with the Sâilles process, with simultaneous production of alumina instead of cement.

Elsewhere, SO_2 is directly converted to ammonium sulphate by the German Katsulf method; and of special interest is the joint manufacture of nitric and sulphuric acids under the Matignon-Kachkaroff patents. Total output for 1948 is estimated at 1.4 million tons, and by 1950, 2 million, of which half should be used for superphosphate.

Electrolytic chlorine, for which the demand is rapidly growing, is to be considerably enlarged, up to 130,000 tons in 1950

together with 100,000 tons $NaOH$. Here again much is needed in respect to plant repair and extension, as well as additional supplies of electric power. Chlorine is now increasingly required for chlorinated derivatives, e.g., in the manufacture of phenol from chlorobenzene instead of the sulphate. More power is also required for chlorates, of which plant capacity is 40,000 tons and 1947 output was 20,000 tons.

In the important fertiliser section the 1950 estimates (1938 in brackets) in 1000 tons; are: nitrogen 500 (200); P_2O_5 800 (400); K_2O 800 (300). The sub-commission hopes to increase nitrogen production capacity ultimately to 750,000 tons. Monthly output for 1948 so far is about 17,000 tons. To assist in solving the hydrogen problem it is suggested that natural gas, such as that of Saint-Marcet, may be used, e.g., in the methane plus water method. Output of pre-war superphosphate was 1.2 million tons; for 1947-48 it is hoped to reach 3 million tons (500,000 P_2O_5); and in 1950-1, 4.8 million. Ambitious plans, too, have been made for mixed fertilisers, and considerable progress made.

Calcium carbide production has reached pre-war level of 13,000 tons per month, while plant capacity should be increased to 20,000, the chief limiting factor being adequate power for the electric furnaces. Calcium cyanide should be better employed for organic synthesis, e.g., nitroguanidine, than as fertiliser; and every effort must be made to increase supplies of acetylene for several fairly obvious reasons, and it may be more economically produced from natural gas (Saint-Marcet methane) than from carbide.

Sulphate Supplies

In regard to sulphur, etc., France is well supplied with sulphates, especially gypsum, which could be used for production of elemental sulphur or ammonium sulphate. Native sulphur mines yield about 150,000 tons towards a total home demand of 800,000 tons. These should be further developed; and more efficient recovery secured from coke ovens, etc.

In the organic industries, hydrocarbons, and especially petroleum come first, as a source of numerous valuable chemicals. The Saint-Marcet natural gas is being more thoroughly exploited: 14.5 million cu.m. (9500 cal.) were, it is said, produced in

(Continued at the foot of page 490)

CANADA'S SYNTHETIC NITROGEN

War Plants Now Serving Agricultural Needs

CANADA was a pioneer in the production of nitrogen fertilisers from the air. Low cost hydropower at Niagara Falls was largely the cause of the establishment there of a plant for the manufacture of calcium cyanamide in 1909, and by 1930 at Trail, B.C., and Sandwich, Ont., installations for the manufacture of nitrogen and fertiliser were well developed.

At the outbreak of World War II, Canada was producing some 10,000 tons of by-product nitrogen from the manufacture of coke. This with 110,000 tons of synthetic nitrogen represented the Dominion's entire production of 120,000 tons, about 90 per cent being exported.

Great Britain asked Canada to create additional facilities for the manufacture of nitrogen in the spring of 1940, as her own sources of supply were within the bombing area, reserves of ammonium nitrate being required. Four new projects were started, two at Trail, B.C., one at Calgary, Alta., and the largest at Welland, Ont.

Thus began the now historic production of this chemical, and the ammonium nitrate has contributed much to the production of food-stuffs since the conclusion of hostilities. The existing plant at Trail was extended to provide for an additional output of 50 tons of ammonia per day, while ammonia was also manufactured in a new plant at Trail, using coke-ammonia to make 250 tons of ammonium nitrate a day.

Thus, in 1941, Canada's synthetic nitrogen capacity increased more than twice. With this capacity, the demand for explosive nitrates was satisfied. As the British plants still continued in commission, the increased supplies in 1942 posed the problem of utilisation of the existing ammonium nitrate produced. The problem, therefore, was to adapt the ammonium nitrate production of explosive plants for use in agriculture.

Ammonium Nitrate Difficulties

As originally made for explosives, ammonium nitrate was a material which absorbed water from the air, which made it quite solid and difficult to use. In this condition it was not wanted in a fertiliser plant. It was hard to dispose of. To solve the problem, a joint co-operative programme between the Canadian authorities and the United States Department of Agriculture was immediately initiated to determine methods of preparing ammonium nitrate so that it would be reasonably acceptable to agriculture as a fertiliser.

In this effort to solve the problem of improving the physical condition, most success-

ful experiments were conducted by a chemist at a plant in Calgary. He allowed a concentrated solution of ammonium nitrate to drop through the air. Using a tomato can with a perforated bottom, he poured ammonium nitrate solution from the top of a four-storey building in the Calgary plant and, to his intense gratification, discovered that the particles that fell to the floor were white rounded beads that looked like tapioca. This process, known as "prilling," was rapidly adopted, first at Calgary, then by the other Canadian Government plants.

The product was packed in waterproof bags, and thus a very high grade fertiliser known as nitraprills, containing about 33 per cent nitrogen, was marketed and met with great favour.

Superior Fertilising Material

Continuous experimentation has resulted in producing a highly superior fertilising material. To-day, the entire Canadian production of ammonium nitrate fertiliser is in the improved prilled form, consisting of small granular pellets of pure ammonium nitrate dusted with an inert material, usually diatomaceous earth. This assists in preventing caking of the product, and the resulting material is free-flowing and exceptionally easy to handle for direct application to the soil, and as a component in complete fertilisers.

The guaranteed analysis is now 33½ per cent nitrogen. Extensive use has shown that Canadian ammonium nitrate is safe to handle and store if special precautions are followed.

This material is produced in Canada by the North American Cyanamid Company, Ltd., and the Consolidated Mining and Smelting Company of Canada, Ltd., under the respective trade names of Acropills and Nitraprills. Packing at all Canadian plants is in five or six-ply paper bags, including at least two plies of moisture-proof, laminated, asphalt paper, to prevent moisture absorption by the material, and this also reduces the possibility of caking.

Ammonium nitrate fertiliser for purposes of transportation is classified as an oxidising material. Special precautions, under published instructions of the Canadian Board of Transport Commissioners and the National Harbours Board, are taken in its movement by land and water. It offers much the same fire hazard as sodium nitrate and may be considered a vigorous supporter of combustion, due to its liberation of oxygen at moderately high temperatures.

Canadian consumption of nitrogen fertiliser

has increased from some 11,000 tons in 1940 to about 27,000 tons in 1947. It will be noted that on a population and crop acreage basis, Canada still uses relatively little nitrogen as compared with some other countries. About 90 per cent of it is used as an ingredient of mixed fertilisers and 5 per cent as materials for side dressings mainly the leafy vegetable crops.

The estimated tonnages of nitrogen materials for all fertiliser purposes used in the trade year ended July 1, 1948, were: ammonium nitrate, 28,455 tons; sulphate of ammonia, 36,174 tons; cyanamid, 9654 tons; ammonium phosphate 16-20, 4385 tons; ammonium phosphate 11-48, 40,250 tons; nitrate of soda, 620 tons; nitrogen solutions, 7210 tons; and anhydrous ammonia, 570 tons.

In the trade year 1946-47 there were used in Canada, according to the Dominion Bureau of Statistics, a total of 657,782 tons of all fertilisers, and of this 561,464 tons were mixtures. It is notable that of the total tonnage of mixed fertilisers used, 176,647 tons were of 2-12-6 grade and 164,986 tons were of 4-8-10 grade. The amount of 2-12-6 and 4-8-10 sold was 341,638 tons, or about 60 per cent of the total tonnage of mixed fertilisers. The 2-12-6 is the most popular fertiliser for grain and farm crops and the 4-8-10 the potato and garden crop fertiliser.

Other countries may be using more nitrogen for these crops, but so far Canada has not found this necessary.

Canadian exports of nitrogen under International Emergency Food Council allocations during the trade year ended June 30, 1948, are estimated at 132,422 tons of nitrogen as compared with the total domestic consumption of 27,000 tons.

The significant change from pre-war exports is that North and South America now account for a much larger proportion of the world export pool. In pre-war years, Germany, for instance, was a net exporter of nitrogen, while at present Germany is a net importer.

That the world pool of exportable nitrogen for 1948-49 is not nearly large enough to meet world requirements needs to be underscored. If present world price levels are maintained sufficient to purchase the nitrogen needed, it is quite unlikely that there will be enough nitrogen fertiliser in 1948-49.

Without the very substantial war and post-war increase in production in Canada and the United States, the world supply position to-day would be much worse than it is; in fact, without this additional tonnage, world supply problems would be almost insurmountable.

(From an article by S. G. Barkley, Foreign Trade Service, Canada, in *Foreign Trade*, Ottawa).

FRENCH CHEMICALS REVIEWED

(continued from page 488)

March of this year. Work in this direction, both for liquid oil and gas, is being pursued in Aquitaine by the SNPA under M. Blanchard, and in Toulouse region by the Unitec engineers. The Monnet Plan envisages crude petroleum supplies amounting to 11 million tons in 1950, and 15 million in 1955, of which refineries in France would deal with 8.1 and 11.5 million respectively.

These large figures seem remote from present possibilities. Among the difficulties is the short supply of steel for refinery construction or repair. Nevertheless, the importance of crude as a raw material for chemicals is not overlooked, and the sub-commission for petroleum chemistry has an extensive programme for 1950, including solvents, detergents and plastics.

In other fields, such as cellulose, synthetic rubber, resins and plastics, far-reaching plans have been made, including as a primary essential the better use of home raw materials, such as the Landes forests for cellulose, wood pulp, and other forest products; whereby, among other things, heavy imports of cotton and linters could be reduced. Production of plastics in France should reach 106,000 tons in 1950, or four times the present level.

S. AFRICA REVIEWS FLUID MEASURES

B RITAIN'S exporters of certain chemical products may have to change their gallon containers for the supply of customers in South Africa.

Numerous manufacturers in the Dominion, adversely affected by imported products, are considering the abandonment of South African and British measures and substituting those current in the U.S.

The S.A. Bureau of Standards, which has formed a special committee to examine this problem, is seeking also the views of commerce and industry regarding a project to require that all imported liquids shall be packed and marked only in South African measures. The views of industry are being sought, too, concerning an additional proposal that it shall be made illegal to continue the system of selling liquids in containers labelled "large," "medium" or "small," without quoting exact quantity.

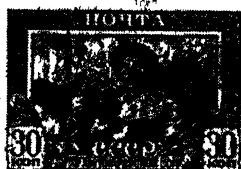
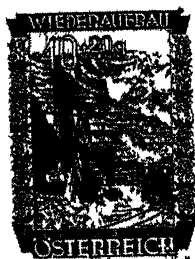
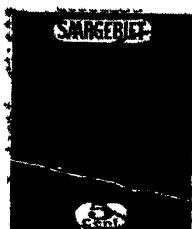
It has been pointed out by the Bureau of Standards that one American gallon is equivalent to three quarts and thirteen Imperial fluid ounces and, as there are forty fluid ounces to a quart, this means that there are twenty-seven Imperial ounces less in an American gallon than in an Imperial gallon as used in South Africa and Britain.

Stamps of Six Nations Dramatise Coal



Mining Industries of Two Continents

The vital function of a vigorous coal mining industry in the affairs of a nation is widely recognised throughout Britain to-day. On the Continent and elsewhere the theme is far from new, as this "Chemical Age" excursion into philately demonstrates. Illustrated here (left to right, above) are Australia, 5½d. (green), issued in 1947 to commemorate the finding of the first coal seam at Newcastle in 1797; Germany, 12 pf. (carmine), commemorating the acquisition of Sudetenland in 1938; Saar, 20 pf. (slate and green), showing a pit-head at Reding, 1921. Left and right, second row: Russia, 10 k. (blue) depicting coal-miners at pit-head, released in 1941 in honour of the industrial output drive; Poland, 20 z. (slate), issued 1947. Left and right, third row: Saar, 5 pf. (black and orange) miner, 1922 printing; Germany, 6 pf. (green), charity issue of 1934. Below, left to right: Austria, 40 g. (brown), the 1948 stamp showing colliery at Erzberg in Styria; Russia, 30 k. (violet), coal miner and colliery on 1941 series; France, 2 f. 15 c. (slate-purple), produced 1938-41, depicting miners leaving pit-head



European Chemicals and Minerals

Industrial Stringency in Sweden Dollar Shortage Cuts Chemical and Metal Supplies

DRASTIC cuts of imports which have to be paid for in dollars threaten to have a serious adverse effect on Swedish industry, especially in essential commodities such as chemicals, iron and steel, metals, etc., which are already scarce.

Reduction in production, as the *Finans-tidningen* points out, would seem to be an inevitable consequence, unless Sweden can make up her imports by purchases from non-dollar countries. The most serious effects of these import restrictions are pointed out by this journal.

In chemicals, dollar imports for the third quarter of the year are cut to 2.8 million kronor. Imports of paraffin have been curtailed and it will be allocated to the wall-board industry only for export production; production in the rubber industry will be cut, as only half the chemicals needed have been allocated; the sulphur imports will be insufficient to meet the needs of the cellulose industry—even presuming the Swedish sulphur kilns at present closed down, are re-opened.

Engineering production will be slowed up by the short supply of thin steel plate and bolt iron. Non-ferrous metal imports have been cut to one-third of the earlier plan, which is causing considerable concern over its effect on the aluminium, and canning industries.

A decrease in production of motor-car tyres and delay in telephone plans are necessitated by the cuts in textiles and electrical materials respectively.

POLAND'S ECONOMIC PLAN

ACCORDING to data given in the journal of the Central Polish Planning Office, *Gospodarski Planowa*, the value of the output of the State-owned industrial enterprises is to be increased next year, which is the last year of the Three-Year Plan, by 21.23 per cent. Plans have also been made for geological investigations to locate further deposits of coal, lignite, oil, potassium and of materials for the ceramic industry.

Coal output is to be increased next year by ten per cent over the planned figure for 1948 (67.5 million metric tons), oil output, the 1948 target for which is 155,000 tons, is to be increased to 103 per cent. Iron-ore output is to rise by 25 per cent from the 1948 level of 700,000 tons, and steel output, planned at 1,783,000 tons, is to be raised by 20 per cent. In the chemical industry, sul-

phuric acid production is to be increased by no less than 28 per cent from the 1948 planned level of 116,000 tons, superphosphate output is to be higher by 84 per cent (400,000 tons), and an increase of 15 per cent is sought in the manufacture of nitrogen compounds.

ITALIAN SALT OUTPUT

PLANs for the development of salt production of the country within the ERP scheme are attracting the attention of the Italian government.

One of the principal salt-beds in Italy is Margherita di Savoia, approximately six miles from the little port of Barletta in the region of Bari. The yearly output of this bed is roughly 300,000 tons, but without undue effort it could reach 500,000 tons, and the Direction of Italian Monopolies, which controls the salt production, now aims to double the current production figure.

Salt from Margherita di Savoia had a good reputation, and exports grew steadily from 1935 until the beginning of World War II. There was a natural interruption during the period of hostilities, but in 1946 exports again revived and have been improving ever since. One of the problems is the question of loading. The sea is extremely shallow here, and salt has to be conveyed by barges to ships lying about two miles out; this method is expensive and slow.

Barletta can load a larger number of vessels at a cheaper rate, and during the war loading was transferred there, but when it finished, local rivalry caused a return to the old method.

GERMANY'S SWISS ASSETS

INFORMATION from Berne is that the Swiss Government Compensation Office has given notice of the forthcoming liquidation of Leukon A.G., Zurich. This firm was founded in 1921 by Degussa Deutsche Gold- und Silberscheideanstalt, Frankfurt, for the marketing and distribution of their products. The share capital of Leukon A.G. is 400,000 francs, and the company engages in the manufacture of and the trade in chemical products and metals.

United Kingdom firms wishing to investigate can obtain full details by writing direct to the Swiss Compensation Office, Talstrasse 62, Zurich, to whom bids should also be made.

India's Steel and Chemicals Nationalisation Programme Criticised

REFERRING to the proposal of the Government of India to build one or two steel works to be run by one or more statutory corporations, Sir Ardeshir Dalal, presiding at the 41st general meeting of the Tata Iron and Steel Co., Ltd., in Bombay, said, while there was no question that more steel needed to be produced in India, it was unfortunate that the Government had chosen the steel industry for their venture on nationalisation.

It was one of the most complicated and difficult of industries, the nationalisation of which, even in a country like the United Kingdom, with its long industrial experience and high technical development, was looked upon with grave apprehension by a large number of people, said Sir Ardeshir.

The Government had rejected a scheme submitted by the company, under which the technical and managerial experience accumulated by the industry would have been made available to the Government in the management of the new works.

This year production of finished steel had declined from 753,000 tons to 664,000 tons, compared with the peak production of 839,000 tons in 1941-42.

The three consultant firms engaged by the Government of India, namely, The Koppers Co., Arthur G. McKee and Co., and the International Construction Co., are now busy drawing up independent reports on the first stage of the proposed Government-owned, million-ton steel plant. All the three firms are required to submit their reports by the end of the year.

* * *

Hopes have been raised that the plans for the manufacture of aluminium in the Central Provinces and Berar, will make possible a large exploitation of the china clay, very large deposits of which are found in the Provinces. According to Mr. S. Dogar Singh, who investigated the deposits, recent scientific experiments have found use for china clay on a commercial scale as a source of alumina for the manufacture of aluminium. Neither the Provincial Government nor the industrialists have so far exploited these deposits, the main reason being that the cost of the preliminary outlay is very heavy.

* * *

Representatives of the Indian Government and the Indian Supply Mission were at a recent meeting at Washington between officials of the United States Commercial Departments Office of International Trade and a committee from the Alkali Advisory Panel,

at which a proposed licensing plan for screening applications for alkali products was announced. The Indian officials, Mr. R. R. Saksena, Indian Consul-General in New York, and Mr. M. B. Shankar, of the Indian Supply Mission in Washington, were invited to the meeting to gather first-hand information on problems faced by licensing officials with expert applications for alkali products far exceeding the total output of the United States.

The recently announced export quota for caustic soda grants India 14 million lb., which is approximately 10 per cent of the total export quota for the third quarter of 1948. The Indian quota for the first six months of this year was nearly 25 million lb.

* * *

The Prime Minister of India, Pandit Jawaharlal Nehru, who is also the President of the Board of Scientific and Industrial Research, has appointed a committee to draw up plans and estimates for the Central Electro-Chemical Research Institute to be established at Karaikudi in South India. Dr. Alagappa Chettiar is chairman of the committee.

* * *

Dr. Lichi Pan, member of the Industrial Development Working Party of the United Nations Economic Commission of Asia and the Far East, arrived in Madras recently in the course of his tour on which he is collecting data in regard to the fertiliser industry. He visited the Mettur Chemical and Industrial Corporation's factory and the fertiliser and chemicals factory at Alwaye. Dr. Pan, who is also a member of the National Resources Commission of the Republic of China, stressed the importance of the fertiliser industry in the production of food. Vermiculite, the mineral which gives rise to new possibilities in building construction, has just been discovered in Mysore State, by the Mysore Geological Department working under the direction of Dr. Charles Pichamuthu. Large deposits of this mineral have been found in Tumkur and Hassan districts of the State.

Production of Chemicals and Metals.—The index figure for production of chemicals in the U.K. in June, published by the Central Statistic Office, is 117, which compares with the monthly average for 1947 of 105. The figure for ferrous metal manufacture is 120 (102 in 1947), and for non-ferrous metals 118 (113 monthly average in 1947).

DUTCH CHEMICAL PROGRESS

Great Demand for Agricultural Chemicals

by J. GREENROYD

SINCE the war the Netherlands has shown a growing impulse toward greater industrialisation, an impulse which has become apparent to a marked degree in the chemical industry. This tendency has been partly due to ground lost in shipping, agriculture and stock-breeding, and partly because a number of products formerly made by the Germans are now manufactured in Holland. Of the latter, those which affect the Dutch chemical industry include such products as plastics, pharmaceutical goods, artificial teeth, mineral oil and its by-products, etc.

The Dutch chemical industry is based in the main upon its mineral wealth—coal, salt, petroleum, and upon vegetable and animal raw materials produced at home, together with a few imported raw materials, including pyrites for the manufacture of sulphuric acid, crude phosphates for making superphosphates, and iron and zinc ores.

Before the war about 30,000 workers were employed in the industry, which was composed of 2250 concerns (including pharmaceutical chemists) whose produce was valued at about £20 million. By 1947 the Dutch chemical industry employed 38,000 workers, and there has been a tendency for the average size of factories to increase.

Agricultural Chemicals

One of the outstanding branches of the industry in Holland has been the manufacture of artificial fertilisers. This received a great impetus from the large home demand of the intensively conducted agriculture and market gardening. The relative volume of fertilisers used in Holland in normal times was the largest in the world, being 60/70 kilogrammes per hectare compared with less than ten kilogrammes in Great Britain and about three kilogrammes in U.S.A.

Both nitrogenous and phosphatic fertilisers are now normally produced in sufficient quantities to satisfy the home demand and to allow a surplus for export.

The most important producers of nitrogenous fertilisers are the State mines, the Coke Oven Gas Company (M.E.K.O.G., Ltd.), and certain gasworks.

The Compagnie Néerlandaise de l'Azote, situated at Sluiskil, Zeewuys-Flanders, also produced large quantities of nitrogenous fertilisers. This factory was completely destroyed during the war, but production was expected to be resumed there this year.

In consequence of planned expansion, the yearly production of the whole industry in about 1950 will be the equivalent of approximately 200,000 tons of nitrogen.

For the manufacture of phosphatic fertilisers, which is the most important group, crude phosphate has to be imported by way of the navigable waterways to the eight producing factories situated mostly in the regions of Rotterdam and Amsterdam, and at Sas Van Gent in Zeewuys-Flanders. Before the war, production was about 550,000 tons a year and this was surpassed soon after the end of hostilities, but just at this time there was an abnormal home demand of 600,000 tons due to the shortage of fertilisers during the war years. The superphosphate factories are also important producers of sulphuric acid.

Superphosphate Deal

As a result of talks earlier this year between the Russian military administration and a Dutch delegation in Berlin, it was agreed that Holland would supply 80,000 tons of superphosphates to the Russian zone, while Holland would receive in return 80,000 tons of potassium salt (40 per cent), delivery to be made in the manuring year 1948-49.

Among the products manufactured from coal are benzol, xylol, naphthalene, etheric dichlorate, nitrogenous products and ether. The turf in the province of Drenthe serves as raw material for active carbon, and from the salt which is found in Geldersche Achterhoek are manufactured hydrochloric acid, chlorine, soda and alkaline soda.

Mineral oil assumes an important rôle in the Dutch economy. Although in the past very little has been obtained in Holland itself, the output from the national oil has recently become more significant. Borings have been made in the province of Drenthe, which, according to estimates, are expected to yield approximately 240,000 tons in 1948. These fields belong to the Netherlands Petroleum Company and management is in the hands of the Bataafsche Petroleum Company, which holds 50 per cent of the capital, the remainder being held by the Standard Oil Co., of New Jersey.

Of greater importance still are the mining undertakings operated in other parts of the world—particularly Dutch East and West Indies. Space forbids details of the activities of the Royal Dutch Shell Group. Suffice to say that considerable extensions are in-

tended to the Bataafsche refinery at Pernis, Rotterdam. The processing capacity of this refinery is at present 1 million tons of crude oil per year. When the contemplated extensions have been completed in 1953 this capacity will be increased three-fold.

A second refinery at Pernis is also expected to be completed in 1950 for the Caltex Company (the Texas Company and Standard Oil of California) which is scheduled to cost about \$20 million. The daily capacity of the new refinery will be 20,000 barrels of crude oil, chiefly from the Middle East.

The Vlissingse Mineraalolie En Aspaalt Raffinaderij (Vliamar) are also constructing new installations on the east bank of the second petroleum port at Rotterdam.

Petroleum Chemicals

The petroleum industry is developing the production of chemical by-products. The Royal Dutch Shell Group is now manufacturing such products as washing agents, solvents and artificial fertilisers, as well as raw materials for synthetic resins and synthetic rubber. At Pernis two factories are being constructed for Shell chemicals. The first factory is expected to be capable of producing 25 million kg. of washing soap per annum.

The second factory, which is also to start production this year, will manufacture synthetic resin and will have an annual capacity of two million kg. This will form a raw material basis for the plastic industry. Paraffin wax will constitute the foundation for the soap, while polyvinyl chloride is manufactured from gases produced by the cracking operations in the oil refinery. Both factories are expected to be completed this year.

The Royal Dutch Shell possess a very up-to-date laboratory at Amsterdam along the River IJ, where a staff of over 1500 persons are employed, as well as a testing station at Delft from which originated the cetane number that has been universally adopted for measuring ignition quality of diesel oil.

During and since the war research has been made into the possibilities of producing a synthetic substitute for the fats, which, essential to the supply of sebacic fatty acids for soap, were becoming very scarce. In Holland a compound similar to the German Tylose HBR has been produced which serves as a great improver of the various synthetic washing preparations. This is the raw sodium salt of carboxymethyl-cellulose, prepared from caustic cellulose and monochloroacetic acid.

The manufacture of artificial silk yarns and tissues has progressed very rapidly in recent years, the firms of N.V. Kunstzijdes-

pinnerij NYMA and AKU/HKI being well-known. In spite of severe war damage, pre-war output has been appreciably exceeded and production is steadily increasing.

In 1947 the exports of rayon yarn and rayon fibre amounted to 27,560,000 lb. Besides the main Netherlands mills at Arnhem, AKU controls plants in several other countries.

Coal-tar distilleries, of which there are six large concerns, are of considerable importance within the Dutch chemical industry, as is the plastic side of the industry, which is providing for future expansion.

In a small country like Holland, where the home market is fairly quickly satisfied, production is determined to quite a large extent by the exportable surplus possible. This applies very much to the chemical industry and the following table compiled by Economische Voorlichtingsdienst shows how, up to the end of last year, exports were faring compared with 1946 and the pre-war years:—

	1947	1946	Average 1938 and 1939
Artificial silk yarns and tissues ...	65.0	24.6	16.2
Artificial manures ...	25.2	3.3	21.1
Dyes, lacquers and varnishes ...	19.5	7.3	2.3
Quinine... ..	15.5	0.5	9.0
Linoleum and felted floor cloth ...	12.4	4.3	1.6
Medical products (not including Quinine) ...	10.4	4.4	3.1
Coal tar products ...	8.5	2.7	15.0
Synthetic scents ...	7.2	2.2	1.7
Salt	6.0	3.2	1.5
Dry dyes	5.3	2.8	3.4
Glue	3.9	1.5	1.1
Saccharine	3.0	2.4	0.01
Essences	2.8	1.5	1.1
Etheric oils	2.1	1.2	1.7
Magnesia	1.8	0.5	0.6
Burnt pyrite	1.3	0.7	1.5
Printers ink	1.1	0.3	0.1
Artificial resins ...	1.0	0.5	0.4
Cosmetics	1.0 ...	0.7	0.3

Future industrial expansion in the Netherlands is expected in three main directions:—

1. Heavy chemicals.
2. Industries dependent to a great extent on laboratory research and individual invention.
3. Old-established industries, such as textiles.

The first involves such installations as oil refineries, fertiliser factories and iron and steel works, which will make good use of the natural sites and the large river estuaries, while the second class includes such items as pharmaceutical products and the third class could include rayons.

It would seem, therefore, that the chemical industry in the Netherlands is well-placed to assume a rôle of prime importance in the future industrial set-up of the country.

American Chemical Notebook

From Our New York Correspondent

PRODUCTION of industrial inorganic chemicals for July was slightly higher than in July a year ago. In the U.S. Bureau monthly survey reductions below the level in June were reported in 22 and increases in only 13 of the 35 chemicals under review. For the fifth successive year production of "dry-ice" (solid carbon dioxide) has increased, figures for July being 92,036,000 lb., an addition of 10 per cent on the previous record. Among the "heavy volume" inorganic chemicals, production of sulphuric acid and salt cake was almost the same as the previous month; soda ash, ammonium nitrate, nitric acid and phosphoric acid showed an increase, but synthetic ammonium sulphate, chlorine, hydrochloric acid and caustic soda were less than the previous month.

* * *

Mexico still remains dependent on imports for about 45 per cent of her steel requirements, according to the U.S. Department of Commerce, which has recently completed a survey of industry there. In spite of the expansion of the steel industry during the war, imports of major steel products from the United States had risen from a pre-war figure of 36,000 metric tons to 205,000 metric tons in 1946 and were still insufficient. This is mainly due to a large public-works programme including irrigation, electrification, road building and other improvements. Mexican steel plants continue to expand, but demand is greater than the rate of production, scarcities being most marked in tin plate, terplate, all kinds of pipes, and structural and reinforcing steel.

* * *

The vital importance of chemists and other trained scientists as teachers was emphasised by Professor Linus Pauling, of the California Institute of Technology, president-elect of the American Chemical Society, on his return from an eight-months visit to Europe, during which he served as George Eastman Professor at Oxford University. The professor warned America of the necessity of keeping up an adequate supply of trained scientists, and of the problems which arose once a deficiency had been allowed to occur. He cited the case of Great Britain where, he said, a vigorous programme involving grants to universities for support and instruction of basic research, and the provision of scholarships and fellowships for university students and research workers, was seriously handicapped

by the shortage of professors and teachers and the limited amount of laboratory space available in the universities.

* * *

In order to break the alleged monopoly of the aluminium industry, the U.S. Department of Justice has asked the Federal Court in New York City to issue an order directing Alcoa (the Aluminium Company of America) to dispose of some of its plants and properties. Mr. Roy A. Hunt, president of Alcoa, claims that the action of the Justice Department is purely political, and asserts that the monopolistic charges are unfounded. Competitors, he states, now have control of quite half the U.S. aluminium ingot market, and enjoy a competitive advantage by the use of plants built by Alcoa for the government without fee or profit, and turned over to them on very liberal terms. The present suit is the outcome of an anti-trust suit against Alcoa begun in 1937.

* * *

One of the biggest oil refinery projects in recent times has been set in motion at Woodbridge, New Jersey, by the acceptance of the Shell Oil Company's offer to purchase for \$270,000 280 acres in the municipal area. Here will be constructed an oil refinery at a cost of some \$100 million, which will probably operate in 1953. It will employ more than 2000 and its pay roll may require about \$8000 million annually.

* * *

The action of the British Ministry of Supply in raising the prices of a number of metals because of increased costs of imported supplies, is not expected to change materially the price levels of similar metals in the United States. Executives in non-ferrous metals industries there—recorded the *New York Times* on October 2—stated that American buyers may, however, be handicapped in purchasing these supplies from foreign sources. The prices paid by American buyers for lead, for example, are considerably higher in world markets than in domestic markets. It is said that lead has been imported into the United States at 23½ cents, compared with a domestic price of 18½ cents. The British, these executives are reported as saying, have been paying only 19½ cents for their competitive purchases, and have subsidised the use of the metal in England, selling it for 1½ cents.

TECHNICAL NEWS AND SERVICES

A wide variety of interest and some entertainment are to be found in No. 8 (July issue) of the "Standards Review" published by the British Standards Institution. Contents range from articles on the importance of measurements and basis of their standardisation, protection of iron and steel and design for plastics to such subjects as spring mattresses and the significance of dotted lines, dealt with in lighter vein. There are also news items from all parts of the world. The frontispiece is a portrait of Lord McGowan, president of the institution.

* * *

A new, quick-setting, urea resin adhesive for the woodworking industry that sets in 10 minutes at room temperature (75°F.), has been developed in the research laboratory of the Timber Engineering Co. Known as Colpres 10, the glue is of a type that requires no special equipment in its use. The glue is stated to be water resistant, non-staining and of great strength. It is

a two part adhesive, consisting of a dry powder formaldehyde resin which is mixed with water and applied to one of the wood surfaces to be glued, and a liquid hardener which is applied to the other surface.

* * *

The Osaka Foreign Trade Institute, Osaka, Japan, has issued a trade catalogue of about 200 pages listing the names and addresses of various categories of industries in that area. It contains a classified commodity index covering various classes of chemical products and metals. There is also a Japanese-English vocabulary for company names and addresses.

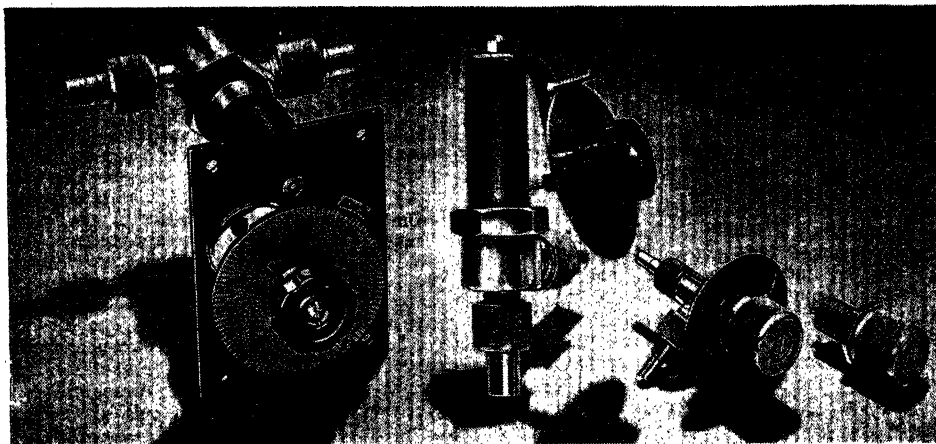
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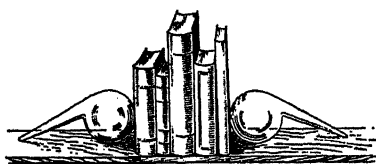
A new pamphlet on further development in fuel oil additives has been released by E. F. Houghton & Co., of W. Lehigh Avenue, Philadelphia, Pa. The new product is described as a rapid means of removing sludge from industrial fuel oil systems.

Fine Control Valves for High Vacua

Illustrated here are some of the fine control needle valves for high-vacuum control recently produced by W. Edwards & Co. (London), Ltd., Lower Sydenham, S.E.26. Left to right: Type L.B.2, in which a counter mechanism enables the needle to be re-set to any opening. Type L.B.1, a bellows sealed needle valve having a lever reduction movement, also flow control per

degree of dial revolution. Type W.S.1, compact vacuum-sealed needle valve with elastomer-type spindle seal; the stainless steel needle, positively operated by a fine screw-thread control, is not permitted to rotate. Type R.S.1, is a small chromium-plated brass air admittance or "vacuum break" valve; positive vacuum isolation is given by the rubber-nosed spindle.





A CHEMIST'S BOOKSHELF

Tables of Physical and Chemical Constants.

By G. W. C. Kaye and T. H. Laby.
10th Edition. London: Longmans,
Green & Co., Ltd. 1948. Pp. 194.
21s. net.

For many years these tables have filled the need for a comprehensive and up-to-date set of English physical and chemical tables in a volume of moderate size. The authors, both late professors of the University of Melbourne, have revised in this tenth edition the scope of their work from the previous editions, which reach back as far as 1911, and important new tables have been incorporated. The contents of the book are devoted to general physics and astronomy; heat; sound; light, including spectroscopy; electricity and magnetism; X-rays; atoms and ions; chemistry and geology; isotopes; moments of inertia; and mathematical tables. This volume is calculated to be extremely useful to students as well as to industrial workers. The comprehensive index gives good guidance through the numerous sections of the work, and in the case of many of the divisions there is given a brief résumé containing references to books and original papers which may profitably be consulted.

* * *

Applied Chemistry Reports. Annual Reports of the Society of Chemical Industry on the Progress of Applied Chemistry, 1947. Vol. XXXII, pp. 518.

The working chemist, almost overwhelmed by the deluge of published matter, yet a little anxious lest something of value should have been overlooked, gratefully looks forward to the publication of these annual reports, as a selective review of important work in a complete year. The 1947 volume has been printed in smaller type than the last, enabling the field to be reviewed in a tightly packed 518 pages. Subject matter is divided into 29 sections, embracing a wealth of material presented, of which it is possible here to comment upon only a few items of current interest. The small body of information that has been published on energy from atomic fission and on the separation of isotopes is readily summarised in a few lines. In the sphere of jet and

gas turbine engines there are brief digests of work on gas combustion problems and of the developments in special alloys. The latter need to show strong resistance to creep, be corrosion-resistant and stable at high temperatures. Not only have 18/8 chromium-nickel steels been modified, but entirely new cobalt-chromium and cobalt-chromium-nickel alloys have been successfully applied. The review by Dr. Foxwell on gas and tar products discusses the impact on these industries of impending nationalisation. "Opportunity for technical development on a national . . . basis which the technologists have long sought has now been provided." Output of gas from carbonisation in the gas industry rose from 194,518 million cubic feet in 1921 to 307,092 in 1945. Including gas bought from coke ovens and water gas, the total distributed by the gas industry in 1945 was 433,106. Underground gasification of coal is considered unsuitable in general for British conditions. Important advances have been made in the chemical protection of crops from insect attack, points out Dr. Martin in his article "Pest Control in Agriculture." Synthesis, sphere of action, toxicity and the limitations of DDT have all received attention. A one-step method of synthesis of DDT (1:1:1 trichloro-2:2-di-p-chlorophenyl-ethane) uses chloral hydrate, chlorobenzene and chlorosulphonic acid. It is considered harmless to operators applying it for insecticidal purposes and fears of its action on bees have not been substantiated. Dr. Southgate, director of water pollution research, contributes the article on "Sanitation and Water Purification." The disposal of many trade waste waters has occupied the attention of his laboratory and those of others. A notable success was the development of an aerobic process for retting flax. Obviating all former difficulties in waste water disposal, the new process is a recirculating one, producing no waste water. These annual reports become indispensable. As immediate reading matter, they provide general surveys of fields of individual interest by leading workers. As reference works, they have the advantage over abstracts and formal indexes of discussing compounds and processes parallel or closely related to those being reviewed.

Home News Items

E.C.A. Grants.—Purchases from the United States approved by the Economic Co-operation Administration recently announced include zinc ingots for 2.72 million dollars and treated hardwood by Italy for 1.5 million dollars.

New Copper Tubing Factory.—Site leveling is expected to begin at once on the copper tubing factory of I.C.I., Ltd., which is to be erected on the Liverpool Corporation's Kirkby Trading Estate. It is anticipated that the completion of one section will take more than a year.

Argentine Rail Contract.—United Steel Companies, Ltd., has confirmed that an order for 1 million tons of steel rails and fishplates has been placed with British steel railmakers by the Argentine Government through the purchasing commission in London. The contract is valued at about £6 million and delivery will be over six years.

Works Visit.—Members of the Institute of Metals, who have been holding their autumn meeting at Cambridge, recently visited the works of the Manganese Bronze & Brass Co., Ltd., Ipswich, and inspected the tool shop, laboratories and dispatch department, as well as the extension mills, rolling mill foundries and forge.

Mobile Oxygen Equipment.—The expansion to Scotland of the Oxygeneaire organisation under the name Oxygeneaire (Scotland), Ltd., with a depot in Deepdene Road, Westerton, Glasgow, is stated to be the first stage in the creation of a series of depots in other Scottish towns for the operation of the 24-hour service system featured by this firm.

Chemical Duties Changed.—The Treasury has made an order exempting aldehyde butyric (butyl aldehyde), normal, and methylene chloride from Key Industry Duty, for the period beginning with September 30, 1948, and ending with December 31, 1948. "The Safeguarding of Industries Exemption (No. 8) Order, 1948," is published as Statutory Instruments, 1948, No. 2169. (H.M.S.O., 1d.).

Textile Education.—More candidates than ever before have this year secured National Certificates in Textiles, announces the Textile Institute, which is jointly responsible with the Ministry of Education for the National Certificate scheme. Of 131 entrants for the ordinary National Certificate, 109 passed, and of 85 entrants for the higher National Certificate, 82 were successful. Fifteen higher National Certificate winners obtained distinctions.

Change of Address.—The name of Tinsley (Industrial Instruments), Ltd., whose removal to North Circular Road, West Twyford, N.W.10, was recorded last week, was inadvertently reproduced incorrectly.

Scottish Pottery Plan.—The Scottish Council (Development and Industry) is to establish a sub-committee to consider the revival and development in Scotland of the pottery industry, at one time important, which has declined in recent years to negligible proportions.

Scottish Factory's New Premises.—British Products (Sanmex), Ltd., chemical, soap and disinfectant manufacturers, whose premises at St. Andrew's Square, Glasgow, were burned down some months ago, have now moved into a new home at Dalmarnock Road, Rutherglen.

Oil Refinery for Britain.—A project to build a £20 million oil refinery near Millbrook is under consideration by Trinidad Leaseholds, Ltd., who have approached the south-east Cornwall Water Board as to the possibility of supplying water. The refinery would require nearly one million gallons of water a day.

U.K. Coal Output.—Coal production in Britain last week showed a slight decrease, the total of 3,894,600 tons comparing with 4,116,000 tons in the previous week. Mr. Gaitskell, Minister of Fuel, at a management conference on fuel efficiency in Birmingham on Tuesday, appealed to industrialists for further economies in coal. Where possible he asked them to use low-grade fuel.

New Scottish Paint Factory.—A new factory for the manufacture of cellulose paints is to be built on a site of about three acres in Glasgow. The corporation sub-committee on sites and buildings, has agreed to grant a lease of the site to A. H. Robinsons and Sons, paint merchants and manufacturers of Govan, Glasgow. The firm, meanwhile, proposes to erect temporary factory buildings.

Coal Economy.—A weekly saving of 150 tons of coal has been achieved by William Fulton & Sons, Ltd., dyers and finishers, Glenfield, Paisley. The works, employing 450, have been chosen as an example of what the Scottish Fuel Efficiency committee is doing. Mr. J. Dalton, general manager, stated that the saving represented 25 per cent of the firm's fuel consumption and was obtained with a second-hand boiler.

Personal

New Appointments in Eire

OFFICERS elected by the annual general meeting of the Irish Chemical Association held in Dublin were: President, PROF. T. S. WHEELER; vice-president, D. CROWLEY; hon. secretary, G. F. O'SULLIVAN; hon. treasurer, J. G. BELTON. Council: MESSRS. V. C. BARRY, T. G. BRADY; PROF. W. COCKER, PROF. T. DILLON, W. V. GRIFITHS; MISS M. MACNEILL, N. V. NOWLAN, and F. T. RILEY.

PROFESSOR GEORGE JAYNE, director of the Institute of Cellulose Chemistry at Darmstadt, is now on a visit to Australia, where he will advise on the manufactures of rayon textile and paper. He hopes to assist in overcoming some of the difficulties encountered in making paper from short-fibred eucalyptus woods.

The presentation of awards to members by the retiring-president, MR. ARTHUR WALKER, and induction of the president, MR. HASWELL ALDER, are the main items at the meeting of the North of England Institute of Mining and Mechanical Engineers being held to-day (Saturday). Awards are as follow: G. C. Greenwell bronze medals to DR. WILFRED TAYLOR and MR. C. R. L. HALL, George May and Institute prizes to: T. A. BOND, G. D. EDWARDS, WILLIAM HAZON, DONALD HINDSON, C. D. HORNSBY, G. W. F. LECK, W. D. TONKINSON, and J. S. WOOD.

The Dunlop Rubber Company announces the appointment of MR. MAURICE F. COOP, as secretary to the company in succession to Sir Charles Tennyson, C.M.G., whose resignation was recorded last week. Mr. Coop, who is 41, joined Dunlop in 1936 and has been head of the company's legal department.

The governors of the Royal Technical College, Glasgow, have appointed DR. FREDERIC M. BRUCE, to the Chair of Electrical Engineering, in succession to PROF. S. PARKER SMITH, who retired recently.

SIR ELLIS HUNTER has been appointed chairman of Dorman Long & Company in succession to LORD GREENWOOD.

Gassing Mishap in Fife Colliery.—Three lives were lost and one man was taken to hospital as a result of a gassing accident at Lockhead colliery, near the town of Wemyss. The men were at work to seal off a pocket of gas in the Dysart seam of the colliery when they were overcome.

Interrupted Studies

Higher Education in the Army

THE subject of the continuation studies under the Army Educational Scheme of young men called up for National Service in the Army who, having already been accepted and registered as students either at a university or with a professional body, find their academic or professional preparation interrupted for a period of at least twelve months, is dealt with in a helpful letter from the Director of Army Education received recently by the Institution of Chemical Engineers, of which the following excerpt gives the salient points:—

"We are agreed that the first essential is to have full particulars regarding each man in this category as soon as he is enlisted so that his individual educational needs may be known and met as early as possible in his service. To this end it would seem desirable that any man called up for National Service in the Army who is registered as a student at an institution of higher education, should be provided, by that institution, with a pro-forma showing the course of studies he is taking, his immediate objective, and, if possible, a list of text-books which he has been recommended to read.

"With this authoritative information the educational staff of the man's unit would be able to make the necessary arrangement for adequate continuation studies with the minimum of delay. It would be for the War Office to ensure that students were made aware of the suggested machinery at the time of their call-up. It was thought that the universities and the professional bodies might be prepared to assist in this matter by providing the required information on application being made by the students."

Purchasing Officers' Report

A year of record activity was reported by the retiring chairman, MR. THOMAS F. TURNER (chief purchasing agent, English Electric Co., Ltd.) in his address at the annual conference of the Purchasing Officers' Association, Cheltenham. The main object of the association, which now has nineteen branches and over 1600 members in England, Scotland, and Wales, is to raise the status of the purchasing officer. Students and junior members are helped by the education scheme, while an appointments register is maintained at the association's head office in London. MR. F. O. ASHMORE (the Calico Printers' Association, Ltd., Manchester) was elected president for 1948/1949.

Overseas News Items

Resistant Wood Coating.—A coating newly developed in the U.S.A.—Carbokote—for the protection of wood in many forms, including liquid containers, floors, etc., is stated to resist temperatures up to 325° F., to give complete adhesion under all ordinary conditions and to be suitable for application by brush or spray.

Franco-American Mining Company.—Mining operations have been started, by Compagnie Franco-Americaine des Metaux, recently formed with French and U.S. capital to develop iron ore possibilities in French Guinea. Estimates issued by the company indicate a potential yearly output of 8 million tons.

£2.75 m. Phosphate Deal.—The Australian and New Zealand governments are to acquire the rights of the large phosphate deposits on Christmas island at the end of this year for the sum of £2,750,000. Christmas Island, which forms part of the Straits Settlements, has an area of about 60 sq. miles; phosphate is the only export and in 1940 amounted to 288,006 tons.

Chilean Copper Products.—A decree issued this week by the Ministry of the Treasury, Santiago, Chile, authorises the sale of Chilean copper products to countries unable to pay in dollars. It is expected that the new decree will especially favour Argentina, Spain, Italy, and France, among the dollar-short nations which will be allowed to pay for purchases in their own currencies, under certain conditions.

New Spanish Companies.—The following chemical and pharmaceutical establishments have recently been registered in Spain: Primma, S.A., Barcelona, intends to manufacture 560 kg. of glycerophosphates and 375 kg. of other phosphates per month; Aplicaciones del Acetileno, S.A., Barcelona, to produce 100 kg. of acetylene derivatives per day; a number of companies intend to manufacture relatively small quantities of plastics and plastic goods.

Use of German Synthetic Fuel Plant.—The management of the Gelsenkirchen Synthetic Fuel Co. has recently concluded an agreement with the German Vacuum Oil Co. and the Standard Esso Co. according to which the latter are to make use of the Gelsenkirchen plant for the manufacture of synthetic fuel. A similar agreement has been concluded between the German subsidiary of the Shell group and the Union of Rhenanian Lignite Works, Wesseling, concerning the use of the plant at Wesseling.

Trinidad Oil Proposals.—The Petroleum Technologist and Inspector of Mines in Trinidad has stated that local oil companies plan to spend some \$5 million per annum during the next three years in exploration and development. Work is at present confined to the south end of the island, and wells will probably be drilled considerably deeper than in the past.

New Irak Oil Source?—Bagdad newspapers, quoting an official source on October 3, reported that the "Basrah Oil Company have discovered rich petroleum wells in one of the areas of Basrah hitherto unprospected, in a concession granted to a British oil firm." The Basrah Oil Company obtained an exclusive concession to explore the oil resources in vast areas of southern Irak in 1938.

Manganese from West Australia.—A message from Perth, West Australia, from the correspondent of *The Financial Times*, states that a local syndicate which has reopened the old Horseshoe manganese deposits, 90 miles east of Meekatharra, has contracted to ship 1000 tons of ore each month to month. American buyers are said to be seeking contracts for 100,000 tons annually, but the State railways cannot at the moment handle this quantity of ore.

Ammonia Compressors for Durban.—The *Board of Trade Journal* records that the United Kingdom Trade Commissioner at Durban has forwarded a copy of contract inquiry No. E.2183, issued by the City of Durban for the supply of two 60-ton ammonia compressors, complete with motors, switchgear, starters and a liquid receiver, for the municipal abattoir. The closing date for receipt of tenders is November 19. The specification is available for inspection at the Export Promotion Department (Room 1073), Thames House (North), Millbank, London, S.W.1. Reference 41272/48 should be quoted.

Italian Oil Refinery Record.—Pre-war and post-war records were broken by "Aquila," Soc. per Azioni Tecnico Industriale, Trieste, with a crude oil input of over 54,000 tons during the 31 days of August, 1948. The refinery, which was almost completely destroyed by bombing during the war, has been rebuilt, and since restarting operations in June, 1947, the distillation plant has processed an aggregate of 500,000 tons of crude oil. Another record was recently established at "Aquila" when the South African tanker *President Brand* (17,220 tons) discharged a cargo of 15,000 tons of naphtha from Arabia in 37 hours 30 minutes.

Next Week's Events

MONDAY, OCTOBER 11

Institute of Metals (Scottish Section), 39 Elubank Crescent, Glasgow. 6.30 p.m. D. S. Burwood: "Technique of Extraction Processes."

TUESDAY, OCTOBER 12

Institute of Metals (South Wales Section), Royal Institution, Victoria Street, Swansea. 6.30 p.m. D. W. Hopkins: chairman's address.

Scientific Film Association, Royal Institution of Great Britain, 21 Albemarle Street, W.1. One-day conference: "The Film in Scientific Research," opening by Sir Robert Watson-Watt. 10 a.m. to 9.30 p.m.

Royal Society of Tropical Medicine, Manson House, 26 Portland Place, W.1. 6.30 p.m. First meeting of the session: Dr. D. L. C. Jackson and Dr. W. S. Reid of the Distillers Company, Ltd.: "The Degradation of Vinyl Polymers."

Society of Chemical Industry and British American Research, Ltd., Gleneagles Hotel, Perthshire. "High Vacuum Convention." (2 days.)

Manchester Federation of Scientific Societies. Society of Instrument Technology. Institution of Electronics, College of Technology, Manchester. 7.30 p.m. Dr. Edmundsen: "Electronic Development in Instrumentation."

WEDNESDAY, OCTOBER 13

Society of Chemical Industry (micro biological and nutrition panels), Food Group, 56 Victoria Street, London, S.W.1. 6.15 p.m. Dr. E. F. Gale: "The Role of Vitamins and Metals as Co-enzymes in Bacterial Metabolism."

Royal Institute of Chemistry (London and South-eastern Counties section), I.C.I. Paints, Wexham Road, Slough. 2.30 p.m. G. R. Cornish: "Methods of Determining Molecular Weights of Polymers." 5 p.m. C. H. Young: "Performance of Paint Films."

Institute of Welding (North London branch), Enfield Technical College. 7.30 p.m. A. Baines: "Thermit Welding."

THURSDAY, OCTOBER 14

Chemical Society, Burlington House, Piccadilly, W.1. 7 p.m. Reading of original papers. R. D. Haworth, J. McKenna, and N. Singh: "The Constitution of Conessine"; G. Dunn, J. J. Gallagher, G. T. Newbold and F. S. Spring: "The Antibacterial Compound of Aspergillus Acid."

Oil and Colour Chemists' Association

(London section), Royal Institution, Albemarle Street, W.1. 6.30 p.m. Prof. H. J. Emeléus: "The Impact of Radioactivity on Inorganic Chemistry—III. Some Applications of Radioactive Substances."

Manchester Federation of Scientific Societies

Chemical Society; Royal Institution of Chemistry; Society of Chemical Industry; Manchester University. 6.30 p.m. Prof. R. A. Morton: "Biochemistry of Vitamin A."

FRIDAY, OCTOBER 15

Royal Institute of Chemistry (London and South-eastern Counties section), Burlington House, W.1. The Geological Society. Prof. H. B. Nisbet: "Anaesthetics."

Manchester Federation of Scientific Societies

Plastics Institute, Engineers' Club, Manchester. 6.45 p.m. Chairman's address: "A Review of Thermoplastic Materials."

Society of Dyers and Colourists, Gas Department showrooms, Manchester. 6.30 p.m. Prof. W. T. Astbury: "Adventures with the Electron Microscope."

HIGH VACUUM CONVENTION

ARRANGED by British-American Research, Ltd., of Hillington North, Glasgow, and sponsored by the Society of Chemical Industry, a convention to discuss high vacuum techniques is to be held at the Gleneagles Hotel, Perthshire, on October 12 and 13. It will be under the presidency of Sir Charles Darwin, K.B.E., M.C., F.R.S., director of the National Physical Laboratory. Papers to be read include: "Fundamental Aspects of High Vacuum Technique," by Dr. S. Dushman; "Application of High Vacua in the Paint and Plastics Industry," by Dr. J. C. Swallow and Dr. J. Gourlay; "Application of High Vacua to Dehydration," by R. S. Morse; "Application of High Vacua to the Metallurgical Industry," by R. A. Stauffer; "Application of High Vacua to Distillation of Fatty Oils," by Dr. E. W. N. Fawcett; "Application of High Vacua to Distillation," by R. S. Morse; "Developments Arising out of Experiments on Vacuum Distillation Considered as an Illustration of the Impact of One Technology on Another," by Dr. C. R. Burch; "High Vacua in Nuclear Physics and Atomic Energy," by Prof. M. L. E. Oliphant.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

STEWART PLASTICS, LTD., London, S.W. (M., 9/10/48.) September 6, charge, to Cheltenham and Gloucester Building Society, securing £6000 and further advances, charged on 45 Morrish Road, Lambeth. *£5274. September 6, 1947.

Satisfactions

CHESTERS, WOOD & Co., LTD., Keighley. (M.S., 9/10/48.) Satisfaction September 8, of charge registered January 28, 1947, to the extent of £776 10s. 4d.

JAMES BRIDGE COPPER WORKS, LTD., Walsall. (M.S., 9/10/48.) Satisfaction September 3, of debentures registered March 14, 1918 (fully).

LA FARGE ALUMINOUS CEMENT CO., LTD., London, W. (M.S., 9/10/48.) Satisfaction September 7, of debenture stock registered June 25, 1946, to the extent of £5555.

MONOTON COKE & CHEMICAL CO., LTD. (M.S., 9/10/48.) Satisfaction September 9, of debentures registered February 13, 1946, to the extent of £13,332.

Company News

Wm. Neill & Son (St. Helens), Ltd., achieved record production of steelwork and plant for chemical and other factories in the year ended in March. £10,000 is transferred to general reserve and a surplus of £31,568 is carried forward. The proposed dividend of 6d. per share, less tax, was approved.

New Companies Registered

Banbury Paint and Drysaltery Company, Ltd. (459,358).—Private company. Capital £2500. To carry on the business of manufacturers of and dealers in paints, oils, colours, etc. Directors: J. K. Parkinson, A. E. Weir, W. Weir. Reg. office: 29 Horse Fair, Banbury, Oxon.

Dyequick Products Ltd. (459,370).—Private company. Capital £1000. Manufacturers of and dealers in dyes, chemicals, drugs, etc. Directors: B. Krenin and Mrs. R. Krenin. Reg. office: 122 Newgate Street, E.C.1.

Farekem Industrial Chemicals Ltd. (459,400).—Private company. Capital £500. Manufacturers, exporters and importers of chemicals, salts, acids, alkalis, drugs, etc., and to adopt an agreement with R. E. Roberts for the purchase of a trademark, "Farekem Rust Remover." Directors: R. E. Roberts, T. Scott. Reg. office: 172 Upper Brook Street, Manchester.

A. Saalfeld & Co., Ltd. (459,150).—Private company. Registered September 27. Capital £10,000. Distillers, distillers' chemists and merchants, dealers in essential oils, colours, gums, etc. Directors: Fdk. H. Saville, Chas. Kemp, Doris K. Saville. Reg. office: Shield Works, Royds Street, Stockport Road, Manchester, 13.

Turkdean Development Ltd. (459,343).—Private company. Capital £100. Manufacturers, importers and exporters of chemicals and insecticides. Directors: A. Monteith, W. Leyland, G. V. Howard, R. G. Pilkington and N. D. Wingrove. Solicitors: Greenwood Milne & Lyall, 32 Ely Place, E.C.1.

Chemical and Allied Stocks and Shares

STOCK markets were more active earlier this week, with prices in most sections showing gains on balance in response to more hopeful City views of the international situation. It is being assumed that the bulk of the £43 million payment due to holders of Argentine rail ordinary and preference stocks will be reinvested in British Funds. Consols and Treasury 2½ per cents have been favoured, also 3½ per cent War Loan, while among the nationalisation stocks, Transport 3 per cent were up to 99½, the best level since dealings started last January.

Imperial Chemical provided the best feature among leading industrials, and were favoured because the company combines industrial and rearmament activities. The old shares advanced further to 46s. 9d., while the new shares (now 20s. paid) were up to the peak level of 25s. 9d. The new will become fully paid at the end of this month when their final call of 20s. 6d. per share is due. They are now being strongly favoured, because they are a cheaper purchase than the old shares, still being free of stamp. Take-over prospects now that the National Coal Board wants coke-ovens

has continued to draw attention to British Benzol around 86s. 6d., while Benzol and By-Products have been active around 11s. 6d., and Thorncliffe Coal Rose to 16s.

Monsanto Chemicals were 58s. 9d., Albright & Wilson 28s. 9d., Amber Chemical 2s. shares 9s. 6d., Fisons have been steady at 59s., with Laporte Chemicals 5s. units 20s. 7½d. Burt Boulton & Haywood were quoted at 25s. 7½d., and Turner & Newall were 76s. United Molasses firmed up to 47s. 4½d., units of the Distillers Co. were 27s. 4½d., British Plaster Board 24s. 9d., but Goodlass Wall receded to 34s. 3d. following the increase in the price of lead. De La Rue rallied to 39s., Dunlop Rubber to 74s. 4½d., and Lever & Unilever to 49s. 9d. In other directions, Amalgamated Metal improved to 20s.

Iron and steels became more prominent, it being pointed out that yields are attractive in most cases, while the industry will remain very active partly owing to rearmament; and despite the threat of nationalisation, the market believes "compensation" would have to be above current market prices. Colvilles advanced further to 37s., United Steel were 29s. 3d., Guest Keen 48s. 7½d., Stewart & Lloyds rose to 55s. 6d., and Dorman Long to 32s. Babcock & Wilcox moved up to 71s., and in anticipation of good financial results, T. W. Ward rose to 61s. In other directions Staveley remained prominent, rising further to 89s. 3d. on the market view that a part repayment of capital is probable, following the capital return by Doncaster Amalgamated Collieries, in which Staveley has a large interest.

Elsewhere, Borax Consolidated, after their recent reaction, have rallied to 60s., British Oxygen were 98s. 1½d., and in other directions, British Glues & Chemicals 4s. ordinary eased to 20s. British Aluminium were firm at 47s. 6d., the market assuming that expansion of business and new developments may require more capital, which may be provided by an issue of £1.5 million 3 per cent debentures. Qualcast shares rose 1s. to 63s. 6d. following the full results and chairman's annual statement. Boots Drug 5s. ordinary have been steady at 52s. with Beechams deferred 18s. 3d., Sangers 30s. 3d., and Griffiths Hughes 30s.

British Industrial Plastics 2s. shares were maintained at 6s. 10½d. British Xylonite changed hands around £5, and General Refractories 10s. shares were 21s. 10½d. Oils were uncertain, with Anglo-Iranian at £8, Shell 75s. 7½d., and Trinidad Leaseholds 5s. units 30s. Ultramar Oil slumped further to 42s. 6d., awaiting news of how additional capital is to be raised.

British Chemical Prices

Market Reports

ACTIVE trading conditions are again reported for the leading industrial chemicals and the call from home consumers for deliveries under existing contracts has been on a good scale. The export demand remains persistent and the recent Board of Trade returns show a very satisfactory overseas business in a fairly wide range of chemicals and allied products. The chief price change of the week has been the advance in the convention quotations for red and white lead, due to the increase in the controlled price of pig lead. Dry red lead at £127 per ton is £21 per ton dearer and white lead at £136 per ton is £19 10s. per ton dearer. The advances apply as from October 1. A reduction of 6s. per cwt. on the price of tartaric acid has been reported. A steady buying interest has been in evidence on the coal-tar products market, with cresylic acid and crude carbolic acid as well as creosote oil in appreciable request from home users. The overall demand for shipment has been moderately good and a fair amount of fresh inquiry is reported.

MANCHESTER.—Generally firm price conditions continue to be reported on the Manchester chemical market, although actual upward movements during the past week have been confined to non-ferrous metal compounds, which have been affected by the advance in the metals. On the home market makers have experienced a steady flow of contract delivery specifications against contracts, and good quantities of caustic soda, soda ash and other alkali products, as well as the magnesia and ammonia compounds, are being taken up. A fair amount of home trade replacement buying has also been reported. Shipping business seems to have been maintained at around its recent level. A steady demand for the general run of tar products has been noted.

GLASGOW.—Fairly active conditions have continued in the Scottish chemical market during the week. The demand for solvents and coal-tar products in general has been higher during the past week than for some time. It has not been found possible to meet all orders. The demand for bleaching powder has also been more active, and available supplies have again not been sufficient for prompt delivery. In the export market, conditions have also been fairly active and a few orders have again been booked. In general, the position is fairly satisfactory.

FROM THE LARGEST TO THE SMALLEST

Bamaq
ELECTROLYSERS



Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2 at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Manufacture of substituted benzhydryl ethers.—E. P. Newton. (Parke, Davis & Co.) Jan. 29, 1946. 607,258.

Synthetic resinous adhesives.—Wingfoot Corporation. Oct. 10, 1945. 607,268.

Production of benzene hexochloride and of insecticides containing it.—I.C.I., Ltd., L. J. Burrage, and C. Williams. Jan. 30, 1946. 607,326.

Production of viscous aqueous solutions of proteins.—I.C.I., Ltd., J. E. L. Thomas, and D. Traill. Jan. 30, 1946. 607,327.

Acid wool dyestuffs of the anthraquinone series.—I.C.I., Ltd., F. Lodge, and W. E. Stephen. Jan. 30, 1946. 607,328.

Treatment of polymeric methyl methacrylate.—I.C.I., Ltd. Jan. 30, 1945. 607,329.

Light-sensitive diazotype material.—Chemische Fabriek L. Van Der Grinten July 29, 1942. 607,334.

Process for the manufacture of α -chloro- α -aceto- γ -butyrolactone.—Roche Products, Ltd. (F. Hoffmann-La Roche & Co., A.G.) Jan. 31, 1946. 607,366.

Process for the manufacture of a thiophane derivative.—Roche Products, Ltd. Feb. 2, 1945. 607,367.

Concentration of cobalt-nickel ores.—American Cyanamid Co. Feb. 6, 1945. 607,385.

Stable dispersions of secondary aromatic amines.—E. I. Du Pont de Nemours & Co., B. M. Sturgis, and A. A. Baum. Feb. 1, 1946. 607,391.

Corrosion inhibiting compositions.—Shell Development Co. March 13, 1945. 607,013.

Manufacture of halogenated carboxylic acids.—Boots Pure Drug Co., Ltd., W. Howieson, H. A. Stevenson, and W. F. Short. March 13, 1946. 607,113.

Polysiloxane resin enamels.—British Thomson-Houston Co., Ltd. May 1, 1945. 607,022.

Manufacture of resinous condensation products.—Beck, Koller & Co. (England), Ltd., E. A. Bevan, and R. S. Robinson. June 4, 1946. 607,031.

Magnesium alloys.—J. Stone & Co., Ltd., A. J. Murphy, and R. J. M. Payne. July 11, 1944. 607,588.

Continuous process for manufacturing motor fuel hydrocarbons.—Texaco Development Corporation. March 29, 1940. 607,593.

Production of 1-(3, 4-dihydroxyphenyl)-2-amino-1-butanol and intermediates thereof.—Winthrop Chemical Co., Inc. March 16, 1944. 607,772.

Crystalline alumina and method and apparatus for making the same.—Norton Co. May 8, 1944. 607,689.

Process for the manufacture of phosphatic fertilisers and the products thereof.—Soc. Anon. des Manufactures des Glaces et Produits Chimiques de St. Gobain, Chauny & Cirey. Jan. 22, 1942. 607,602.

Manufacture of indigoid dyestuffs.—Ciba, Ltd. Oct. 13, 1944. (Cognate Application 26597/45.) 607,608.

Production of emulsions of polymerised esters of acrylic and methacrylic acids.—Vinyl Products, Ltd., J. E. O. Mayne, H. Reichard and H. Warson. Oct. 12 1945. 607,704.

Dis-azo-dyes.—Technicolor Motion Picture Corporation. April 7, 1945. (Samples furnished.) 607,792.

Manufacture of biguanide derivatives.—Imperial Chemical Industries, Ltd., A. D. Ainley, F. H. S. Churd, and R. L. Rose. Dec. 31, 1945. 607,720.

Continuous process for neutralising fatty acids.—Procter & Gamble Co. Feb. 23, 1945. 607,721.

Handling of particulate materials.—Imperial Chemical Industries, Ltd., M. H. M. Arnold and R. J. Young. Jan. 18, 1946. (Cognate Application 35881/46.) 607,723.

Alkylsilicone sols and gels.—British Thomson-Houston Co., Ltd. Feb. 10, 1945. 607,426.

Organo-silica sols and gels.—British Thomson-Houston Co., Ltd. Feb. 10, 1945. 607,427.

Process for the manufacture of zinc peroxide.—B. Laporte, Ltd., W. S. Wood, and G. Clennett. Feb. 4, 1946. 607,445.

Horizontal coal carbonising beds.—Payne & Flood, Ltd., L. A. Payne, and J. Flood. Feb. 5, 1946. 607,459.

Process for the preparation of acid anthraquinone dyestuffs.—Sandoz, Ltd. Feb. 12, 1945. 607,467.

Lubricants.—E. I. Du Pont de Nemours & Co. Feb. 6, 1945. 607,488.

Heat-hardenable phenolic resins.—Bakelite, Ltd. Feb. 7, 1945. 607,635.

Methods of producing of vinyl fluoride polymers.—British Thomson-Houston Co., Ltd. Feb. 13, 1945. 607,499.

Piezo-electric apparatus.—British Thomson-Houston Co., Ltd. Feb. 13, 1945. 607,500.

Process for the production of para-oxy-phenyl-arsinic acid.—J. A. Pascual. Feb. 7, 1945. 607,489.

J. M. STEEL & Co., Ltd.

Abrasives	Dehydrated Castor Oil	Polishing Rouge	Sodium Sulphate desiccated
Acidproof Cements	Diammonium phosphate	Potassium Bichromate	Solvents
Antioxidants	Ethyl Cellulose	Preservatives for Glues, etc.	Strontium Salts
Asphalt Impervious Cement	French Chalk	Resins (synthetic)	Synthetic Glues
Barytes Substitute	Lead Nitrate	Rubber Accelerators	Talc
Carbonate of Potash	Manganese Borate	Sodium Acetate	Temperature Indicating Paints and Crayons
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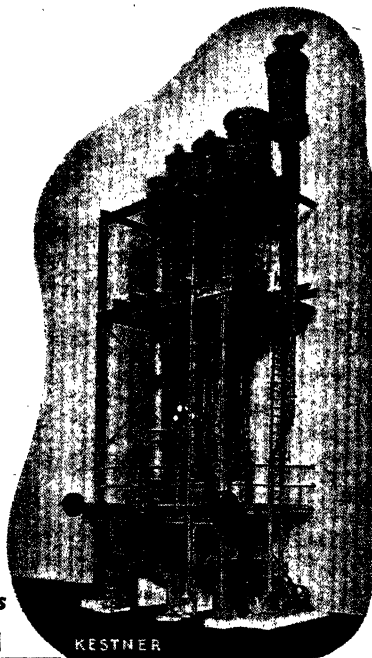
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Process for obtaining 4,4'-dioxi-3,3'-diamino-arseno-benzene-sodium-methane-sulphoxylate.—J. A. Pascual. Feb. 7, 1945. 607,490.

Manufacture of derivatives of β . β -dimethyl-cysteine and intermediates for the manufacture thereof.—Therapeutic Research Corporation of Great Britain, Ltd., Sir I. M. Heilbron, A. H. Cook, and J. R. Catch. Feb. 7, 1946. 607,539.

Process for the electrolytic reduction of poly-hydroxy-carboxylic acid lactones.—Roche Products, Ltd. (F. Hoffman-La Roche & Co., A.-G.). Feb. 7, 1946. 607,540.

Process for the manufacture of artificial sponges from viscose and products resulting therefrom.—Soc. De La Viscose Francaise. June 16, 1943. 607,573.

Polymerisation process and products thereof.—E. I. Du Pont de Nemours & Co. Feb. 9, 1945. 607,734.

Polymerisation of monoethyleneic compounds.—E. I. Du Pont de Nemours & Co. Feb. 9, 1945. 607,735.

Magnetic analysis of a magnetic body.—Magnetic Analysis Corporation. June 9, 1945. 607,753.

Process for the manufacture of moulded synthetic resin articles.—N. V. De Bataafsche Petroleum Maatschappij. June 16, 1944. 607,755.

Process for the manufacture of moulded synthetic resin articles.—N. V. De Bataafsche Petroleum Maatschappij. Sept. 4, 1944. 607,756.

Process for the preparation of lubricants.—N. V. De Bataafsche Petroleum Maatschappij. Aug. 22, 1945. 607,757.

Preparation of organosilicon compounds.—Albright & Wilson, Ltd., and A. G. Taylor. Feb. 12, 1946. 607,811.

Method of manufacturing viscose rayon.—Comptoir Des Textiles Artificiels. Nov. 8, 1944. 607,816.

Process for producing diisopropyl salicylic acid and salts thereof.—N. V. Bataafsche Petroleum Maatschappij. Feb. 25, 1944. 607,831.

Diacetylamidobiphenylenedioxydialkyl-carboxylic acids and process of preparation.—General Aniline & Film Corporation. Feb. 7, 1945. 607,762.

Preparation of amides from acyclically unsaturated compounds.—Rohm & Haas Co. Aug. 18, 1945. 607,765.

Manufacture of hydrocarbon oil compositions.—Standard Oil Development Co. Jan. 29, 1941. 608,214.

Process for the solvent treatment of mineral oils.—Standard Oil Development Co., and Rohm & Haas Co. Aug. 21, 1940. 607,945.

Processes for the solvent extraction of diolefins from hydrocarbon mixtures.—Standard Oil Development Co., and Rohm & Haas Co. Nov. 22, 1940. 607,946; Nov. 22, 1940. 607,947.

Process for the solvent extraction of naphthenes from hydrocarbon mixtures.—Standard Oil Development Co., and Rohm & Haas Co. Dec. 7, 1940. 607,948.

Process for the solvent extraction of aromatics from hydrocarbon mixtures.—Standard Oil Development Co., and Rohm & Haas Co. Dec. 7, 1940. 607,949.

Manufacture of anthraquinone derivatives.—Soc. of Chemical Industry in Basle. Jan. 13, 1944. 607,955.

Manufacture of water-soluble anthraquinone derivatives.—Soc. of Chemical Industry in Basle. Jan. 14, 1944. 607,956.

Treatment of latex and like aqueous dispersions of rubber.—J. F. Boiry. Feb. 26, 1944. 607,958.

Device for the dispersion of a gaseous fluid in a liquid.—H. L. Bendel, and F. Jonueret. Aug. 21, 1945. 608,136.

Method of and apparatus for drying hygroscopic plastic material containing sugar.—A. H. Stevens. (Food Concentrates, Inc.) Aug. 22, 1945. 608,137.

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Science and Production

SO many of the major industrial developments of the past half-century have been due to the application of science to industry, that it is not surprising that those whose business is production are asking what immediate help can be derived from science in the present circumstances. We need greater production in existing industries. We need means to offset rising prices of labour and raw materials. We need new industries that can find markets all over the world. Science, the world has been told, has been the basis of our industrial development. Now if ever was the chance of scientists to show whether the old basis still stands.

Accordingly, it was almost inevitable among the questions the Government put to its Advisory Council on Scientific Policy was one "regarding the directions in which a scientific approach is most likely to promote an increase in the national productivity." The straight answer seems to be obvious. It is that science also works "in a mysterious way, its wonders to perform." The futility of making out a list of the inventions we desire, setting dead-line dates by which they shall be achieved and put into full production, must be evident to all but industrial commissars. The council very sensibly replied that the application of existing knowledge is of prime importance: "Current fundamental research in the physical and biolo-

gical sciences is unlikely from its very nature to have any material short-term effect in increasing productivity, whatever may emerge from its results in the future. For short-term results the more effective application of scientific knowledge is likely to prove much more fruitful."

The application of existing knowledge may be more difficult than appears at first sight and may require concentrated scientific effort. The council has therefore noted the value of "operational research" methods that proved so valuable in the Services during the war, and involved the use of scientific methods to provide quantitative data on which executive action could be based. With a view to making these methods more widely known a book is to be published on the subject under the auspices of the Central Office of Information. Operational research has been defined by Prof. Waddington as "the application of the methods of scientific research to the study of problems which face an executive authority." The underlying principle is to collate the results obtained after control of the different variables.

The council has noted four existing problems that are likely to have a bearing on productivity. If it is agreed that the major need is to make use of existing information, how can we be sure that everyone has the information he needs? Sir Harold Hartley, in a report to

On Other Pages

Leader :		<i>The ABCM Dinner</i>	517
<i>Science and Production</i> ...	509	<i>School of Pharmacy</i>	517
Notes and Comments :		<i>New Plastics in the U.S.A.</i> ...	518
<i>Inquest on Coal</i>	511	<i>Ammonium Sulphate in India</i> ...	520
<i>New Frontiers</i>	511	<i>Restoring Japan's Fertilisers</i> ...	520
<i>Fluorine Chemistry</i>	511	<i>Fertiliser Finance Scandal</i> ...	520
<i>The Perfect Interpreter</i> ...	512	<i>New Fertiliser Technology</i> ...	521
<i>The Stepney Experiment</i> ...	512	<i>Recovering Refinery Acids</i> ...	522
<i>British Property in Palestine</i> ...	512	<i>Studies in Tannery Chemistry</i> ...	524
<i>Cinematography in Scientific Research</i>	513	<i>Scottish Industrial Projects</i> ...	525
<i>New Radioisotopes</i>	513	<i>Dutch Insecticides and Fungicides</i>	526
<i>The I.G. Farben Explosion</i> ...	514	<i>Science and the Textile Fibres</i> ...	527
<i>Ammonium Nitrate Tests</i>	514	<i>Predicting Gas and Fluid Behaviour</i>	528
<i>Magnesia from Seawater</i>	514	<i>Kieselguhr in South Africa</i> ...	528
<i>Cost of Texas City Disaster</i> ...	514	<i>S. American Coal and Steel</i> ...	530
<i>Production and Use of Key Chemicals</i>	515	<i>Rubber Research in the U.S.A.</i> ...	530
<i>British Steel Casting</i>	516	<i>Scottish Hydro-Power Charges</i> ...	530
<i>Lowering Aluminium Costs</i> ...	516	<i>A Chemist's Bookshelf</i>	532
<i>U.S. Aluminium Price Rise</i> ...	516	<i>Helicopter Spraying</i>	536
		<i>Why Output Falls</i>	536

the Federation of British Industries just after the war, maintained that the only effective way was for each firm to have a scientific man on its staff whose duty should be primarily that of keeping in touch with scientific publications and bringing their significance to the notice of his employers. The Advisory Council on Scientific Policy has arranged that there shall be an efficient central information office able to put inquirers in touch with sources of specialist information, since such information is available at the Government research stations, the industrial research associations and other places. The information unit of the intelligence department of the DSIR is also to be expanded to provide a national service of the type required.

The second problem was that of the human factor in production, a subject previously discussed in these columns under the title: "The Problem of Production." Inquiry showed that the level of productivity in different firms within the same industry sometimes varied by as much as 200 per cent and that there was often no obvious explanation of this difference. General economic conditions are often extremely difficult to assess, and in any event cannot account for the differences in the level of productivity between comparable firms. Thus, the concrete objective of raising the level of the least efficient firms

nearer to that of the best is in itself well worth pursuing, since it would go a long way to effecting the general rise of 10 per cent in overall output for which the Government has asked. It is therefore recommended that further research should be undertaken forthwith into such matters as the basic conditions of good morale and efficient organisation, the characteristics of successful Joint Production Committees, the status and position of the foreman, the differences of response as between men and women workers and the selection and training of managing staff. Some of the most effective work in this sphere has been carried out by the large chemical and allied undertakings.

Evidence has been given to the council from several sources that the effective application of the results of scientific research by suitably qualified technologists and engineers is an even more urgent need than the furtherance of research itself and would bring much quicker results. The council seems satisfied to record that "already it appears likely that the supply from universities of men with qualifications in applied science would be double what it was in pre-war years." Our own view is that this state of affairs gives no ground for complacency. The supply of chemical engineers, for example, is far below the margin of safety, and seems likely to remain there.

NOTES AND COMMENTS

Inquest on Coal

WHEN the National Coal Board and the Mineworkers' Union were reported earlier this year to have agreed that 200 million tons of deep-mined coal was a reasonable total figure at which to aim during 1948 it was widely commented that this was taking a very cautious view of what could be achieved with the aid of Saturday working by underground workers or the addition of 30 minutes per day. At last week's "inquest" at the Ministry of Fuel attended by the National Coal Board and the National Union of Mineworkers only one thing appears to have been certain, that Great Britain will not have had, for use or sale, 200 million tons of mined coal by the year's end. Whether the deficiency will be 3 million or a good deal more than that may as well be included among the unpredictable which must now be occupying the harassed thoughts of the joint committee which was set up at the Ministry meeting to study the many departments in which pledges of improved working were not honoured and "to recommend the precise steps to be taken." That phrase, from the Ministry of Fuel's Press note, seems to echo the inadequacy of the tactics employed up to now, which have helped to deprive this country of full participation in the best export market that remains to us. The joint committee must by now have recognised that whatever steps are taken must be forceful and long if we are to honour our undertaking to supply next year 8 million tons more coal to Western Europe alone—without resorting to dismal starvation rationing under which our own industries had to strive along little more than a year ago.

New Frontiers

BUT for the benefactions of the first Baron Trent the University College Nottingham might have had no Chair of Chemistry and—a more immediate deprivation to most of us—there would be no Jesse Boot Foundation lectures. One is reminded once again how real would be that loss by the current publication by the University of Nottingham of the 1948 foundation lecture given by Prof. Linus

Pauling, which seems to raise to new heights the fine quality which has distinguished former annual studies of chemical knowledge and speculation. In "Molecular Architecture and the Processes of Life" Prof. Pauling gives some fascinating glimpses of the frontiers of chemical knowledge in the field of biology. Here investigation, although frequently baffled, seems to be on the brink of justifying conceptions about the structure and behaviour of some molecules which could revolutionise a great part of existing chemical theory and practice. That this work by, among others, A. Tyler, G. H. Beadle, K. Landsteiner and Prof. Pauling himself is directed principally to support medical research—on which it seems capable one day of conferring new power to combat disease and arrest degenerative processes—does not in the least detract from the prospect of a great impetus in the field of pure chemistry. The study of the viruses, for example, encourages the view that some of the simpler ones at least may be regarded as molecules. This conception has been confirmed by the test of crystallisation. This and the complementary study of the likely basis of combination between antibodies and antigens carries to a plane on which all chemists must be concerned the work of which Prof. Pauling has given so stimulating a survey.

Fluorine Chemistry

THE existence of a fairly large body of chemical substances of whose basic characteristics and potentialities in research and industry much remains hidden must represent an effective stimulant of contemporary chemistry. That is one of the conclusions implied in the revealing study contributed by Prof. H. J. Emeléus to the October number of *Endeavour* of the development of fluorine chemistry. This is the kind of contribution which is very much in keeping with *Endeavour's* questing spirit and is capable of having a profound influence on more than a few of our younger chemists, whose course may still be shaped by some such authoritative presentation, brief though it is, of the geography of a field having almost dramatic possibilities. The knowledge that fluorine, more or less familiar as a compound for

nearly two centuries, eluded direct observation until Moissan, in 1886, prepared the element by electrolysis of a conducting solution of potassium fluoride dissolved in anhydrous hydrogen fluoride may add a zest to future investigation, which fluorine's phenomenal activity and early refusal to submit to ordinary physical restraints will not lessen. Now that some of the problems of handling have been overcome, or at least greatly diminished by fresh knowledge and new equipment the production of fluorine has assumed a much more practical interest and the developments, such as the fluorocarbons of extreme chemical inertness and volatility and the versatile anhydrous hydrogen fluoride, are among the comparatively new implements now fairly freely available for fundamental research and offering possibly fruitful results in industry. The affinity, cited by Prof. Emeléus, of the latter compound with the olefinic and acetylenic bonds of organic compounds and its activity as a catalyst in synthesising high-octane petrol are among highly suggestive facets of this provocative subject.

The Perfect Interpreter

THE seven-days' Scientific Film Congress in London which culminated in the day-long summing up on Tuesday may be regarded as having been of historical importance, partly because of the willingness for international collaboration reflected by the participation of 25 countries and the important contribution on crystal structure from the U.S.S.R., and more particularly because of the decisive rôle which continuous photography is capable of playing in scientific affairs. Widely varied as were the views at the congress of what the motion camera can and cannot do, no one has hesitated to admit that cinematography is becoming an essential aid in chemistry, as a recorder of processes much too fast or too slow for the human eye and brain to register, and in nearly every other exact science. Almost inevitably it is taking its place between the useful servant of the records, the photostat, and the revealing high-powered microscopes of recent development. While it may never equal the electron microscope's dramatic powers of investigation, cinematography's gifts as a perfect interpreter, between nations as well as indi-

viduals, entitle it to the widest encouragement on lines which the congress sought to promote. In particular, it will be deplorable if the freedom of purely scientific films to pass all national frontiers is curtailed by financial or political barriers.

The Stepney Experiment

IN times when ill-will and mistrust on the individual plane and bad faith between nations form the substance of a disproportionately large part of the news, realists (and even scientists) are entitled to share the sentimentalist's delight in a happy ending. Happy endings to some of the most dismally unpromising stories form the keynote of "Making Good: The Story of Some London Boys—1861-1948," which has come from the Boys' Hostels Association (now completing its 21st year of existence), of which the president is Lord Leverhulme and the chairman Mr. John Bunn. In the nine little biographies reproduced here of boys taken on by the John Bunn Hostel in Stepney, after the all too familiar miseries between police and probation officers, is solid reassurance that the sinister twist which seems at the moment to run through so much of the contemporary story is not ineradicable. Best of all, these are truth, not fiction, and go far towards proving that the human spirit can still furnish transformations as impressive as any yet produced in the laboratory.

BRITISH PROPERTY IN PALESTINE

BRITISH subjects wishing to register loss or damage of property in Palestine are reminded (in the *Board of Trade Journal*, October 2) that H.M. Government does not accept any liability for compensation for such loss or damage, whether this is claimed under Palestine legislation, under the Palestine Government Notice of May 16, 1947, or otherwise, and whether the claim relates to loss or damage incurred before the termination of the Mandate or as a result of the withdrawal of the British administration. It may, however, in some cases be possible to claim against the successor Government or Governments. H.M. Government will make every effort to ensure that claims of British subjects are expeditiously dealt with by whatever authority becomes responsible in Palestine.

Cinematography in Scientific Research

Dr. S. Fordham on its Use for Recording

IN the absence, through indisposition, of Mr. J. E. Cummins (Chief Scientific Liaison Officer of the Australian Government), Sir Robert Watson-Watt, C.B., F.R.S., presided and performed the official opening of the one-day conference on "The Film in Scientific Research," held under the auspices of the Scientific Film Association, on Tuesday, at the Royal Institution, London. The event constituted a fitting winding-up session of the second International Scientific Film Congress which had taken place in London during the preceding seven days and was attended by delegates from more than 20 countries.

Dr. Watson-Watt referred to the dozen or so peculiar qualities possessed by the cinematograph film in its application to scientific research. The usefulness of the cinematograph camera was, he said, a sort of corollary of scientific processes. It was a kind of time machine, and it provided unimpaired acuity of vision. It was not surprising, therefore, that they had now reached a very advanced stage of application of cinematography to radiography.

At the morning session, Dr. S. Fordham (Imperial Chemical Industries, Ltd.), spoke on "The Film as a Research Tool in Chemistry." He gave an account of the impressions which had been formed in the I.C.I. organisation of the actual use of cinematography as an adjunct to scientific work in the four or five years during which it had been employed. To his mind, one of the greatest benefits of the use of cinematography was that it did not require a great amount of training to understand its technique.

For Industrial Science

For the interest of the industrial scientist, Dr. Fordham mentioned one or two general conclusions which they had arrived at. They had come to regard cinematography very largely as a method of recording. It enabled one to measure something at speed which could then be observed and measured at leisure. But he was bound to say that the cinematograph had not yet shown them anything in regard to chemistry that they had not already at least suspected.

Apart from simple record purposes, said Dr. Fordham, they had been interested in trying to obtain data supplementing their other ideas of how things happened in chemical processes. For example, they had used the cinematograph film in connection with the various aspects of their work on ammonium nitrate.

When they were making microscopic studies in this connection they observed something larger happening at too great a rate for ordinary observation by the human eye, so they decided to use the cinematograph film to show such things as the rate of adsorption of moisture by ammonium nitrate. It had enabled them to conduct further research into the consolidation of this chemical, which had been observed by those who essayed to use it as a fertiliser. The cine film, moreover, had enabled them to observe the crystal transition process in this chemical; the film had actually shown the transition of ammonium nitrate 4 to ammonium nitrate 3.

Dr. Fordham said they had used cine films in studying, among many other things, the chemical reactions of cellulose. Speaking generally, they had found that the cine film was exceptionally useful in physical chemistry research. He thought they would go on and take films at a much higher speed than at present, and would also greatly extend their range.

New Radioisotopes Value as Research Materials

TWO important new research materials, hydrogen-3 and helium-3, have been added to the radioisotopes distributed by the U.S. Atomic Energy Commission, and are available to scientists and research institutions in limited quantities.

Hydrogen-3, also called tritium, is a radioactive gas with a half-life of approximately 12 years. As the only radioisotope of hydrogen, it should prove of special value as a tracer in medical, biological and chemical research. When combined with oxygen, tritium, can also be used as the valuable research tool known as heavy water.

Helium-3, a stable isotope, is only one-millionth as abundant in nature as ordinary helium, which is used in balloons and dirigibles. It may provide valuable clues to the still largely unknown properties of the helium nucleus.

Tritium is isolated after the bombardment of a lithium compound by slow neutrons in a nuclear chain-reacting pile, and helium-3 is obtained as the end product of the decay of the radioactive tritium.

Important knowledge of the fundamental forces which hold the atomic nucleus together has been gained in experiments with tritium and helium-3 by Dr. Herbert Anderson and Dr. Aaron Novick at the Atomic Energy Commission's Argonne National Laboratory, Chicago, Illinois.

I. G. Farben Explosion

ECA to Allot \$6 m. Aid

THE tentative third quarter allotment of the Economic Co-operation Administration funds to the French zone of Germany has been increased by \$6 million, partly in recognition of the losses resulting from the I. G. Farben explosion at Ludwigshafen in July.

Mr. Hoffman informed the French ambassador (M. Henri Bonnet) that "for transfers of commodities and service from the Western Hemisphere and other non-participating countries, we have added an amount of \$6 million to the \$14 million basic tentative allotment. One of the chief factors determining this upward revision was the reduction in exports from this zone on account of the disastrous Ludwigshafen blast."

ECA explained that the higher allotment was not intended to provide funds directly to rebuild the Farben plant, which manufactures colouring products, but was to make more funds available to the zone until normal production and export activities could be achieved again. ECA has been advised that this is expected to be accomplished by January 1, 1949.

AMMONIUM NITRATE TESTS

TENTATIVE results of the experiments with ammonium nitrate stores on the island of Dune, Heligoland, have now been announced by the Home Office.

These tests, held between September 29 and October 2, were being carried out on behalf of a working party appointed by the Home Secretary following the disastrous explosions in the holds of ships at Texas City and Brest in 1947.

The object was to ascertain the effects of intense and prolonged heat on "prilled" ammonium nitrate when stored in bulk. About 240 tons of ammonium nitrate were involved in three trials, one stored in drums in a bunker, and two in barges in which one part was stored in drums and the remainder in paper bags.

No evidence of detonation or explosion was found; further details of the tests are awaited with interest.

Limitation of Advertising.—The Chancellor of the Exchequer's request for the continuance from March 1, 1949, to February 28, 1950, of the voluntary limitation of advertising was considered at a meeting last week of the Standing Advisory Committee of the FBI. A further meeting on the subject will be held shortly.

Magnesia from Sea Water

Increased Output from British Plant

PRODUCTION of magnesia from sea water by the British Periclase Co., Ltd., at its Palliser Works, Hartlepool, is to be stepped up from 27,000 tons a year to 40,000 tons. Mr. Jack Jones, Joint Parliamentary Secretary to the Ministry of Supply, announced this on October 8 when he visited this establishment which is stated to operate the only plant in Europe for the manufacture of magnesia from sea water. The increased output, said Mr. Jack Jones, was necessary for the expansion of the steel industry's output to 20 million tons a year, from its present record output of 15 million tons.

[The importance of magnesia in this connection is in the provision of magnesite for refractory bricks required for the production of basic steel. The increased supply has the further merit of reducing our dependence upon dolomite imports.]

First of Its Kind

The British Periclase Co., Ltd., built for the Government in 1940, when a vast increase in the production of magnesite was called for, a plant at Workington which produced 40,000 tons of magnesia a year. Mr. Jack Jones said these works were the envy of other nations. There was nothing else like them in the world, except in the United States, where they were working in a slightly different way.

When the plant at the Palliser Works was erected in 1937 it was stated to be the first of its kind.

[The establishment by a South African company of a plant at Salomha Bay to extract various salts from sea water was reported in THE CHEMICAL AGE, September 11.]

Mr. Jack Jones said that the industry at Hartlepool showed that private enterprise "could work on behalf of the State in happy co-operation."

Cost of Texas City Disaster

Monsanto Chemical Company announces that it has agreed to accept \$17,312,000 in settlement of its insurance claims for damage to its plant in the explosion and fire at Texas City in April, 1947, states a *Comtelburo* report from St. Louis, which says: "Insurance companies here believe this is the largest single claim ever to be paid." The insurance companies concerned are the Oil Insurance Association of Chicago, Lloyd's of London, and a group of American industrial insurance companies.

PRODUCTION & USE OF KEY CHEMICALS

General Increases since July and August 1947

THE latest issue to hand of the *Monthly Digest of Statistics*, published by the Central Statistical Office (No. 33, dated September, 1948), gives figures of production, consumption and stocks in hand of materials connected with the chemical and related industries—among the other principal British trades—for the month of July, and in some instances for August, compared with the corresponding months of 1947 and with the preceding month of this year, and from these the table below has been compiled.

Production in July in these trades shows a pretty general increase over the same month of 1947, and such production figures

as are given for August also show a distinct upward tendency compared with August last year. In many instances, however, production was appreciably less than in the preceding month of this year.

Estimated numbers of men and women employed in connection with chemicals, explosives, coke ovens and by-product works were little changed from those of the preceding month, being 240,600 in July and 240,700 in June. Employment in connection with oils, greases, paints, varnish, etc., was also practically unchanged in July—117,00 workpeople compared with 116,000 in June.

	July, 1948		Stocks	July, 1947		Stocks
	Production	Thousand Tons Consumption		Production	Thousand Tons Consumption	
Sulphuric acid	122.7*	—	70.4*	103.6*	102.0*	65.6*
Sulphur	—	20.8*	80.3*	—	16.0*	70.7*
Pyrites	—	15.7*	62.0*	—	14.2*	73.0*
Spent oxide	—	16.2*	158.2*	—	14.1*	152.0*
Molasses	13.2	34.4†	189.7	11.7	39.2†	106.9
Industrial alcohol (mil. bulk gal.) ...	2.39	2.20	8.11	2.68	2.82	5.09
Superphosphate	72.0	72.9	87.5	63.0	44.8	154.3
Compound fertilisers	122.3	105.0	135.0	73.0	57.7	105.0
Liming materials	—	341.2	—	—	256.8	—
Ammonia	—	6.37	11.37	—	5.83	3.20
Phosphate rock (agricultural)	—	62.4	164.3	—	54.7	138.9
Phosphate rock (industrial)	—	7.77	22.4	—	4.49	35.4
Virgin aluminium	2.38	12.2	—	2.37	13.3	—
Magnesium	0.24	0.29	—	0.15	0.42	—
Virgin copper	—	25.6	99.9	—	28.9	96.5
Virgin zinc	—	16.1	52.4	—	17.8	30.4
Refined lead	—	16.2	22.3	—	16.1	32.3
Tin	—	2.04	15.7	—	2.30	16.8
Zinc concentrates	—	14.4	47.0	—	13.6	77.0
Pig iron	174.0*	—	282.0*	147.0*	—	380.0*
Steel ingots and castings (including alloys)	284.0*	—	—	245.0*	—	—
Rubber:						
Waste collected	—	0.17†	9.5	0.03†	0.74†	57.3
Reclaimed	0.40†	0.41†	3.91	0.41†	0.39†	4.89
Natural	—	3.25†	138.6	—	2.63†	146.2
Synthetic	—	0.04†	2.02	—	0.04†	2.63

* August.

† Distilling only.

‡ Average of five weeks.

Reserved Occupations

"Professionally qualified scientists" head the short category, circulated recently by the Ministry of Labour, of persons who may be enrolled provisionally if they volunteer in the event of a national emergency. Pharmacists and radiographers are also mentioned as others whose service would be accepted only provisionally. Part I of this notice, "employments from which for the time being volunteers will not be accepted," includes oil shale mining (underground), iron, steel and metal manufacturing (not processing), gas, water and electricity supply, petroleum production, refining and transport.

Private Imports of Liquid Rosin

The Board of Trade announces that no further purchases of liquid rosin will be made on Government account. Private importers will, however, be required to take one ton from Government stocks for each three tons imported. For currency reasons, importers will be required to give an undertaking that they will sell only for approved purposes and to submit to Raw Materials Department monthly returns of sales and stocks.

Applications for licences to import should be addressed to Import Licensing Department, Board of Trade, 189 Regent Street, London, W.1.

British Steel Casting

U.S. Adoption of Sheffield Process

A WARTIME development of centrifugal casting of alloy steel by Firth-Vickers Stainless Steel, Ltd., Sheffield, is described in the U.S.A. as "the most important development in a generation of progress in alloy steel casting." That assessment of the value of the new technology was made by Mr. W. H. Worrilow, president of the Lebanon Steel Foundry, Pennsylvania, announcing that his company had acquired exclusive rights to use in the U.S.A. the British patent process, which is particularly important in the production of jet-propelled aero engines. It is capable of many other applications. The U.S.A. is spending \$500 million in its current programme for the production of military aircraft engines, of which a large proportion employ the turbo-jet principle.

New Engineering Applications

Apart from its immediate importance to warplane engine manufacture, the American industrialist said, the process lends definite promise of adaptability in a variety of new industrial uses. This is particularly true in the case of engineering applications in which highly exacting requirements of heat-resistance and corrosion-resistant service must be met.

Because of the unusual design characteristics and integrity of castings made by the process, the way was opened to production of cylindrical and tubular structures.

Perfectured by Firth-Vickers at its Staybrite Works in Sheffield, the "centri-die-casting" process relates to the casting of molten metals and alloys in heavily-constructed moulds while the moulds are being rotated at high speed around their axes. The molten metal is deposited and solidified under pressure within the mould, thereby producing a symmetrical or cylindrical ring of high density with excellent structural properties throughout. The process is specifically adapted to production of high-melting-point alloys and steels ranging from the carbon steel grades to the new super-alloy types developed to withstand the high temperatures of jet engines.

The agreement just concluded between the British group and the Lebanon company relates to production of highly complex centrifugal castings made possible by the new process. Provision also is made for a continuing exchange of technical and manufacturing information between the two companies in regard to corrosion-resistant, heat-resistant steels and related processes, as well as new steels now being developed by Firth-Vickers.

Lowering Aluminium Costs

The American Chemical Process

CHEMICAL engineers attending the American Institute of Chemical Engineers' meeting in French Lick Springs, Indiana, heard Mr. H. W. Heiser, of the research and development department of the Aluminum Company of America, describe a new process which will lead to lower cost aluminium. The new chemical process is used in the production of cryolite in the electrolytic reduction of aluminium ore to the metal. Cryolite is required in large quantities by the aluminium industry.

The new process avoids high temperatures and the use of the highly-corrosive gas, hydrogen fluoride. The inclusion of hydrogen fluoride, in current practice, requires the expensive replacement of equipment destroyed by corrosion, and heavy expenditure on constructional materials to withstand the corrosive attack.

Another advantage claimed for the new process is that it does not require the high purity fluorspar which is the raw material for the manufacture of cryolite, but can make use of fluorspar containing appreciable amounts of silica.

The new "Fluoboric Acid Cryolite Process," makes use of a mixture of sulphuric and boric acids which react with the fluorspar to form fluoboric acid. This reaction proceeds at moderate temperatures in an open system and without the evolution of corrosive fumes. The fluoboric acid is then allowed to react with soda ash and aluminium oxide to form a high purity cryolite.

U.S. ALUMINIUM PRICE RISE

MARKING the second price rise in three months, the Aluminium Company of America raised the price of pig and ingot aluminium one cent per lb., as from Monday. In making the announcement, which includes higher prices for other of the company's products, Mr. A. Davies, vice-president, said the new price is 16 cents per lb. for 99 per cent aluminium pig and 17 cents for large-sized 99 per cent ingots. Appropriate adjustments would be made in the prices of other products, but the average price of all Alcoa products would remain considerably below pre-war averages. Aluminium ingots were advanced to 16 cents a lb. in July after holding at 15 cents since 1941. The 1939 price, by contrast, was 20 cents a lb. Current aluminium production is in excess of 100 million lb. monthly, but supply is estimated this year to fall short of demand by 400 to 500 million lb.

The ABCM Dinner

Chairman on Current Achievements

A NOTE of confidence regarding the future of chemical production in this country was sounded by Sir Harry Jephcott, chairman of the Association of British Chemical Manufacturers, speaking at the association's annual dinner in London on Wednesday, for which an invitation had been accepted by Sir Stafford Cripps, President of the Board of Trade.

Sir Harry Jephcott recalled the disastrous state of affairs which had existed prior to 1914, when the industry had been unprotected at home, and abroad was defeated by high import tariffs. Now, called upon to play its share in the country's recovery, the industry had been told its duty was three-fold; first to provide the essential domestic needs, second to provide essential requirements of those industries the export value of whose manufactured products exceeded that of the chemical ingredients—for instance, dyestuffs for fabrics—and, third, only after meeting both the preceding requirements to export to the maximum possible extent.

The export of chemicals as a whole now stood at 155 per cent by volume as compared with 1938. Of the total chemical products sold at home or exported, and estimated in 1947 to have a value of £233 million, almost 90 per cent were produced in this country.

Finally, the chairman referred to the two major handicaps of the industry: first the inadequate supply of trained and practical men, and, second, plant capacity on which the productivity of the industry depends.

[A fuller report of the dinner will be published in next week's issue of THE CHEMICAL AGE.]

URANIUM FIND CONFIRMED

ANALYSIS at Columbia University, U.S.A., of a mineral found in the rock fissures of the Katanga mines, in the Belgian Congo, has shown that it contains 60 per cent uranium, 15 to 20 per cent vanadium, and 10 to 15 per cent copper. Described as "a hydrous copper-uranium-vanadium mineral" similar to carnotite—except that carnotite is a potassium not a copper uranium mineral—it should be of great strategic value.

The discovery of the new mineral was made by Dr. H. G. Schuiling, chief geologist for the Union Minière, and Dr. Anton Gray, chief geologist for the Kennecott Copper Corporation. It has been given the name of Sengierite in honour of M. Edouard Sengier, managing director of the Union Minière du Haut Katanga, in recognition of his work for warfare mineral production in the Belgian Congo.

School of Pharmacy

Inaugural Meeting

AFTER 106 years, the College of the Pharmaceutical Society, has ceased to exist as such, but continues under the title of the School of Pharmacy of London University, of which the first session was opened on Wednesday, October 6, with the presentation of prizes and an inaugural address by Mr. Thomas Tickle. Among the guests were Mr. I. von Fisenne, vice-chairman of the German Pharmaceutical Society, and chairman of the German Pharmaceutics, Hamburg, and Mr. G. S. Williams, vice-president of the Pharmaceutical Society, Victoria, South Australia.

To Harwell

Prof. H. Berry, the Dean, gave a comprehensive report of the past session. Among the changes in staff was the resignation of Dr. W. J. Arrol, Senior Lecturer in Physical Chemistry, to take up an appointment in research work on radioactive tracer elements at Harwell. In research work some 27 papers had been published, and the international character of the school had been maintained with research workers from China, Czechoslovakia, Denmark, Egypt, India, and Iraq.

As a result of theses submitted to the University post-graduate degrees of Doctor of Philosophy in pharmaceuticals, pharmaceutical chemistry, and pharmacognosy had been awarded to: I. Michaels, Y. M. Abouzeid, E. Clarke, J. Das Gupta, K. S. Kaikini, R. A. Kahn, D. V. K. Raju, G. G. Kalthod, A. S. Vyas, R. Glascock, D. Sanyal, and D. K. Santra.

The Dean then referred to the change in character and status of the college. Under its new title of School of Pharmacy it would be mainly financed by grants from the University of London, but would receive contributions from the Pharmaceutical Society. There would be an independent governing body which would consist of himself and four persons nominated by each of the following—the University, the Pharmaceutical Society, and the academic board of the school. The council also had power to co-opt other members from research and industry and these were: Sir Harry Jephcott (elected a chairman), Sir Henry Dale, and Mr. W. J. C. Quarrell.

Mr. Tickle, in his address, dealt with the art of pharmacy—the "hand maid" of medicine—tracing its history from the early apothecaries or shop-keeping doctors to the formation of the Pharmaceutical Society in 1841.



An ivory radio cabinet made from P-8 polystyrene is intact, while a cabinet made from a general-purpose polystyrene has collapsed, after both had been immersed in boiling water for 10 minutes

SOME entirely new plastics and much enterprise in widening the field of application were the distinguishing features of the third National Plastics Exposition, which has been drawing an exceptionally large international following at the Grand Central Palace, New York. Some 40,000 had seen the show when it closed on October 1.

Demonstrations of new processes and special machinery were a distinguishing feature of the show, emphasising the exceptional advances in the technique made since the first exhibition staged in New York in 1946. Many concerns demonstrated all the machine processes used in the industry, such as low-pressure and cold moulding, extruding, laminating, intricate assembly parts, and new applications of infra-red techniques covering everything from the production of rock-hard plastics to delicate fabrics.

Among the foreign visitors, the English delegation included Messrs. L. McArd, chairman of the Moulders Group of the British Plastics Federation; W. Charles Waghorne, immediate past chairman; L. Cornelius, Derwent Plastics, Ltd.; J. E. Elliott, E. Elliott, Ltd.; F. E. Wall, Healey Mouldings, Ltd.; F. M. Herzberg, Horn-flowa, Ltd.; H. P. Humphreys, Ranton & Co., Ltd.; P. A. Garrett, Rootes Mouldings, Ltd.; J. Johnston, Universal Plastics, Ltd.; P. S. Adamson, research department, BX Plastics, Ltd., and J. T. Birtwell, of Cascelloid, Ltd.

The list of exhibitors included most of the widely known companies producing basic

NEW PLASTICS IN THE U.S.A.

World Views Third Exposition

plastics materials, among them: Dow, Bakelite, General Electric, American Cyanamid, Monsanto, Du Pont, Celanese, Catalin, Owens Corning Fiberglas, Durez, Westinghouse, B. F. Goodrich, Goodyear, Hercules Powder, Koppers, Tennessee Eastman, Libby-Owens-Ford, Borden Co., Glenn L. Martin.

Indicative of the unconventionality of some of the new uses of plastics was a boat developed by the U.S. Navy, representing the largest single plastics job ever moulded in one piece, and a forerunner of larger craft to be built for the Navy. In its plastics hull the boat is capable of carrying 22 men and is virtually indestructible. Painting of the surface is not necessary and Navy tests have shown that the plastic will not scuff, scratch or split. Six men built the hull in six hours. A comparable wooden hull would have required at least 60 hours. The boat is 28 ft. 9 in. long, has a beam of 10 ft. 3 in., and is powered by two petrol engines. It can attain a speed of 19 knots.

High-Speed Compression Moulding

The development by the Libbey-Owens-Ford Glass Company of a new quick-setting plastic material, Plaskon alkyl moulding compound, which is said to broaden the field of use of plastic material, was given its first public showing at the exposition. The new alkyl is designed to advance the use of ultra-high speed compression moulding.

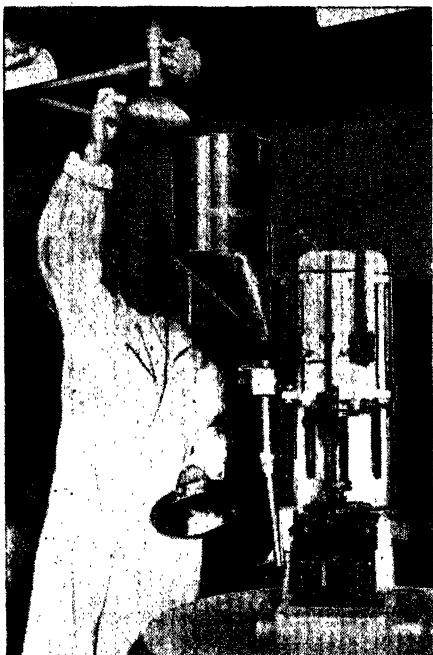
The new compound is a mineral-filled plastic material which is said to possess unusual electric characteristics, high heat resistance, low moisture absorption, unusual dimensional stability and unique moulding properties. It differs from other thermosetting plastics in requiring a very short curing time and it can be moulded in light, high-speed machines.

The new material is offered as being particularly suited for electrical and mechanical applications. Its arc resistance when tested under the standard ASTM procedure is 190 to 200 seconds; the next best standard material yields top values of approximately 140 seconds. The first applications of the new compound are in electrical connectors, switch units and similar parts.

At the show, this new member of the plastic family was transformed from its light brown powder form into finished

sample discs before onlookers. Plaskon had set up a compression moulding machine, which uses air rather than hydraulic compression. It has a moulding cycle six times as fast as standard machines and, in contrast to the massive conventional types, is only 4 ft. high and 4 ft. in circumference.

A new high heat-resistant, monomer-free, non-volatile, polystyrene plastic, embodying three important characteristics not previously attained in material of this type was introduced by the Chemical Division of Koppers Company, Inc. The new plastic, Koppers Polystyrene P-8, is expected to open new fields of use. It is said to be the first highly heat-resistant polystyrene that can be moulded into a glass-clear or coloured product. The new P-8 moulds as easily as the usual grades of polystyrene, whereas highly heat-resistant polystyrenes have presented many moulding problems. In colours, the materials show greater resistance to fading. Uses for which it appears to be especially suited include knife and fork handles, funnels, tea strainers, and other household utensils, brightly coloured radio cabinets



A new moulding press designed and built by Plaskon engineers to exploit the company's new alkyd moulding compound. This machine may be a prototype of a range of light-weight and completely automatic moulding presses

resistant to heat from the valves and storage battery cases.

Much of the credit for development of the new plastic goes to Dr. G. F. D'Alenio, assistant director of Koppers research department, who devised a special process for bonding molecules of styrene, the principal ingredient, in long molecular chains and into various chain-like formations. Through the new process, it was possible to set up a control of molecular formations much more precise than previously attainable.

The new plastic is already being produced on a mass basis with production of 1 million lb. a month.

Building Blocks.

Indicative of the increasing use of plastics materials in construction, plastic partition blocks resembling glass brick but only one-fifth the weight are now available from the Monsanto Chemical Company's materials. The blocks are being moulded by Columbia Protektosite Company, Inc., Carlstadt, New Jersey, using Monsanto's Lustron polystyrene plastic. The blocks are made with interlocking lips permitting non-load bearing walls to be built without using adhesive or clamps. Monsanto also displayed its Fibestos, a transparent plastic to clarify television images.

Two new basic types of Styron were announced by the Dow Chemical Company. The new materials are Sturon 637 and Styron 475. Styron 475, while basically polystyrene, differs from it in the following characteristics: (1) its elongation at break is approximately 10 times that of regular polystyrene, and (2) its impact strength is three to five times greater. The new material was designed primarily to fill the gap which exists between rigid dimensionally stable polystyrene and the tough cellulosic derivative plastics. Styron 637, the other new material, gives crystal and certain polystyrene colours greatly added stability. It increases colour permanence four to five times in such applications as interior lighting parts, fluorescent diffusers, lamp shades, etc.

Design Exhibition.—The Royal Academy, the Royal Society of Arts and the Council of Industrial Design will collaborate to present on October 26 the story of "Design at Work," an exhibition which will show, for the first time, the stages in the creation of a new product from the first sketches, through models and prototypes, to the finished article as it comes off the production line. It will be the first exhibition of the work of Royal Designers for Industry. It will be opened in London by H.R.H. The Duchess of Kent.

Restoring Japan's Fertilisers

Recovery Hindered by Acid Shortage

BEFORE the war, Japan was one of the three principal producers of synthetic nitrates, with fifteen large factories of total capacity in 1941 of 1,242,000 tons; also eight factories producing 232,000 tons of cyanamide. Imports of crude phosphates were large, and 17 works in 1940 had an output of 1,639,000 tons of superphosphate, and 87,000 tons of basic slag. Most of the potash required had to be imported.*

In 1947 production of ammonium sulphate was 732,000, cyanamide 213,000, superphosphate 705,000, and basic slag 530 tons. Imports since the war have considerably improved during 1947-8. In 1947 they were nitrogenous 240,000, phosphatic 1,038,000, and potash 73,000 tons, those of phosphate being practically the same as pre-war. At the same time it is noted that manufacture of sulphuric acid is not yet sufficient to enable full use to be made of these imports for production of superphosphate.

Average annual consumption during 1936-40 was, in million tons: nitrogenous 1.65 (ammonium sulphate 1.1, synthetic 0.35); phosphatic 1.587 (superphosphate 1.28); potash 0.191 (KCl 0.104); organic residues 1.03 (soya cake 0.232, fish and bone waste 0.723).

The Government has estimated the following as Japan's fertiliser needs this and next year.

	N	P	K
1948-49	2.23	1.65	0.3 million tons
1949-50	2.32	1.725	0.31 " "

The K as before will mostly have to be imported, as also will much of the N and some of the P, pending complete restoration and extension of the home fertiliser industry.

Fertiliser Finance Scandal

Allegations that 85 per cent of the national fund earmarked for the rehabilitation of the Japanese fertiliser industry had been diverted to one company, the Showa Denko, led to the resignation last week of the Japanese Cabinet. The fall of the Government is associated with the arrest of Mr. Takeo Kuruusu, director-general of the Economic Stabilisation Board, alleged to have received bribes, and to have been concerned with the acquisition by the Showa Denko organisation from the Reconstruction Finance Bank of 2867 million yen, ten times the company's capital. Showa Denko is stated to be responsible for only 15 per cent of the country's total supply of fertilisers.

* From a report by Centre Nat. du Commerce Extérieur, Paris—M. Normand, Commercial Attaché.

Amm. Sulphate for India

New Factory Nearing Completion

AT a meeting of the Dominion Parliament at New Delhi, the Minister of Industry and Supply, Dr. S. P. Mookerjee, said that a Government factory for the manufacture of ammonium sulphate was nearing completion at Sindri. Proposals were also being examined, he said, for the development of the iron and steel industry, heavy electrical plant and machinery, penicillin and sulpha drugs and synthetic petrol industries, among others.

With regard to oil, Dr. Mookerjee said that representations had been made to H.M. Government and the principals of oil companies who controlled India's main source of oil supply in the Middle East. As a result, the quantity of oil that was likely to be made available in India during the second half of this year was 12 per cent in excess of that imported in the first half of the year.

Eucalyptus Oil Industry

A conference was held at Ootacamund to ascertain the views of the representatives of the eucalyptus oil industry on the possibility of reorganising it on co-operative lines. Mr. E. A. Lasrado, District Forest Officer, Nilgiris, said that some of the manufacturers of eucalyptus oil regrettably were averse to the idea of forming a co-operative society to put the industry on a proper and scientific footing, thereby withstanding competition from Australian imports, as well as to the idea of forming a joint stock company.

The Government had, therefore, found it necessary to reorganise the industry on a co-operative basis with a view to increasing production through up-to-date scientific methods, and a system of joint ownership for which a co-operative society was thought to be the best agency.

Mr. Lasrado urged that the oil should be prepared for export and should conform to the standards of the British Pharmacopoeia. The industry would become extinct if it were allowed to remain in the present condition, he said.

New Fertiliser Plant for Canada.—A proposal to establish a new chemical fertiliser plant, aided by a Quebec provincial government grant, was put forward at the 96th annual exhibition of the Quebec County Agricultural Society. Dr. Gustave Beaudet, of Charlesbourg, told the meeting that the operation of the plant would bring down the cost of fertilisers to farmers from \$25 to \$5 a ton.

NEW FERTILISER TECHNOLOGY

TVA's Effective Use of Indigenous Resources

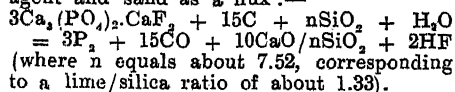
by E. P. HUDSON, M.A., F.R.S.*

THE phosphatic fertiliser manufacturing operations of the Tennessee Valley Authority represent the most interesting example in the world of large-scale experiments into new methods of processing phosphate rock. The Authority relies almost exclusively on the indigenous phosphate rock of the region and on the hydro-electric power which is one of the main industrial manifestations of the complex of activities of the area. Whatever their economic justification, even under the unique circumstances prevailing, the TVA processes represent an outstanding contribution to the advance of phosphate technology.

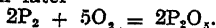
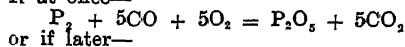
Two main chemical types of manufacturing process can be distinguished: the first is essentially a two-stage process. The first stage is the production of phosphorus pentoxide in forms suitable for its utilisation as a chemical reagent. It is so used in the second stage to break up the apatite structure of the phosphate rock, so as to make the phosphate readily available to plant life.

In this type of process the phosphorus pentoxide not only acts as the disruptive agent, but also contributes to the fertiliser content of the finished product. An economic desideratum is that the quantity of phosphate in the form of reacting agent should be as small as possible in relation to the quantity of phosphate rock acted upon.

In the first stage phosphate rock is reduced to elemental phosphorus in an electric furnace, using coke as the reducing agent and sand as a flux:—



The phosphorus is—either at once or else later—burnt in air to phosphorus pentoxide: If at once—

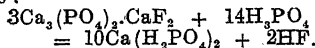


It is interesting to note that in the course of these reactions the orthophosphoric form of the phosphate is entirely destroyed and then potentially reconstituted.

Two examples of the second stage of this type of process are:—

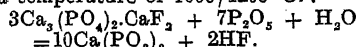
(1) Manufacture of triple superphosphate (45/48 per cent available P_2O_5).

The phosphorus pentoxide is hydrated and used in the form of a 75/80 per cent solution of phosphoric acid (H_3PO_4), the reaction being carried out at normal temperatures:—



(2) Manufacture of calcium metaphosphate (64/67 per cent available P_2O_5).

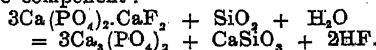
The phosphorus pentoxide is used in the form of vapour, produced by the burning of elemental phosphorus, the heat of combustion of which is used to keep the reactants at a temperature of 1000/1200°C:—



The water required in the reaction is supplied by that physically associated with the phosphorus as it comes from the condensers after the electric furnaces.

The second main chemical type of manufacturing process is a one-stage process in which the apatite structure of the phosphate rock is broken up by the use of simple non-phosphatic reacting agents. The manufacture of ordinary superphosphate is an example of this type, but in the practice employed by the TVA the reagents are even simpler, namely, water and sand.

The type of disruption of the apatite is chemically simpler also, namely, the removal of the calcium fluoride component only—without alteration of the tri-calcium phosphate component:—



From the chemical engineering standpoint, however, the process is difficult, the reaction being carried out with phosphate rock in the molten state at a temperature of 1500°C or more. The heat is supplied by the combustion of fuel oil, the products of combustion of which supply all the water required in the reaction. The product, fused tri-calcium phosphate (28 per cent total P_2O_5) has interesting and agriculturally useful properties.

One distinguishing feature of the TVA phosphatic fertiliser technology is the relatively high degree of concentration, in terms of P_2O_5 content, of the materials produced. The extreme example of this is the production of elemental phosphorus, with a P_2O_5 equivalent of 22.9 per cent, by techniques which permit its separation as such in form suitable for bulk rail or road transport.

* Synopsis of a paper, "TVA Phosphatic Fertiliser Technology," by Mr. E. P. Hudson presented before the Fertiliser Society in London on October 20.

RECOVERING REFINERY ACIDS

Outline of Monsanto Coke Deposition Process

From Our New York Correspondent

THE recently announced Monsanto-Ross-Wilde process in the U.S.A. for the recovery of sulphuric acid and fuel from oil refinery wastes (*THE CHEMICAL AGE*, August 28) consists of the deposition of sludge acid in a relatively thin film on coke of 6 to 10



Gas cooling and scrubbing tower handling combined sulphur dioxide gases from a battery of Monsanto-Ross-Wilde decomposer units and a sulphur burner

mesh size, and the subsequent heating of the coke to the temperature necessary for the decomposition of the acid.

Developed in the last year of the war, the process will accommodate nearly all types of sulphuric acid-hydrocarbon sludge. Physically, the only requisite is that the final feed sludge should be in a reasonably free flowing form. Chemically, the final sludge feed should contain a minimum of 0.10 lb. of hydrocarbon per lb. of titratable H_2SO_4 .

The new process, according to Monsanto Chemical Company officials, yields over 98 per cent of the recoverable sulphuric acid as determined by methyl orange titration of the sludge feed. The decomposer unit operates at relatively low temperature, limiting hydrocarbon evaporation to only the lightest fractions.

In operation, acid is sprayed or trickled on the coke in an unheated mixer. This mixing outside the heating zone is found to be necessary in order to avoid formation of "sponge" coke and the subsequent crushing or high temperature required to extract the acid. After mixing, the coke-acid mixture is passed into a heated decomposer, which has hitherto consisted of a 24-in. steel tube, having from 16 to 24 ft. of heated length, through which the coke is moved by a plain steel ribbon screw.

The maximum coke temperature which is found to be necessary is around 425° to $450^\circ F.$ but this applies only to straight alkylation spent acid containing around 90 per cent free sulphuric acid. For normal refinery wastes, which appear to average around 50 to 60 per cent titratable acidity, a temperature of 350° to $370^\circ F.$ is adequate.

Non-obnoxious coke is discharged from the decomposer and in normal, operation contains 1.5 per cent free sulphuric acid, as determined by one hour extraction with acetone. It is returned by elevator through a controllable feeder to the mixer, the product coke being taken off as surplus from the head of the elevator. This product coke ranges from as little as 4.5 per cent acid decomposed with straight alkylation to as much as 50 per cent on acid decomposed with heavier sludges. It contains up to 9 or 10 per cent total sulphur and is quite free-burning in an over-feed stoker.

85 Per Cent Acid Content

Gas from the decomposer affords from 60-85 per cent SO_2 dry basis, depending largely upon the care taken to exclude air in the operation. With the SO_2 there is, of course, water vapour, representing the free water content of the sludge and the water formed in the reduction of H_2SO_4 by hydrogen. There are also varying amounts of hydrocarbon gases, depending upon the type of sludge, small amounts of CO produced in part by reduction of H_2SO_4 by carbon, and in part by combustion of carbon by small amounts of air infiltrating the system.

For operation with sludges of lower strength, gas from the decomposer is ordinarily taken through a small humidifying tower and then to a water-sprayed lead cooler for the removal of condensable hydrocarbons. Hydrocarbon recovery at this point has varied from 5 to 10 gall. to 35 gall. of condensate per ton of 100 per cent H_2SO_4 .

in the sludge. Condensate varies in colour from a light straw to a dark brown.

Gas from the lead condenser may be handled in two ways. If it is necessary that all contact plant product shall be water white, gas is taken through a combustion chamber for the removal of non-condensable hydrocarbons. By reducing to 3 per cent or less the oxygen in the combustion chamber exit gases an SO_2 content of around 30 per cent, dry basis, can be obtained. Following the combustion chamber, the usual cold gas contact plant purification equipment is brought into use before operation of the converter system.

If, on the other hand, some dark acid can be used, gas leaving the condenser can be dried and scrubbed in 98 per cent acid for the removal of unsaturated hydrocarbons. A small amount of saturated hydrocarbons appears to cause no marked trouble in the converter system. It is, however, necessary that the gases be diluted with air before entering the converter.

Fuel Consumption

Fuel consumption per ton of 100 per cent acid and unit capacity in terms of 100 per cent acid vary with the titratable acidity and with the free water in the sludge to be decomposed. Ordinarily one "double unit" is considered as having a capacity of the order of 20 tons of 100 per cent acid per day, but this may vary from as little as 15 up to 30 tons.

A double unit consists of two tubes mounted side by side in the same furnace and arranged for parallel flow of coke. Fuel consumption is of the general order of 3 million BTU per ton of 100 per cent acid, but this figure will vary with the type of feed.

Monsanto has operated its full-scale pilot plant for a considerable period using the product coke as a fuel. When handled through an "Iron Fireman" over-feed stoker such heating was quite successful, according to the company. In general, the lower the free water in feed acid the better. Optimum strength of feed acid is represented by an acid hydrocarbon ratio giving slightly more than enough hydrocarbon to provide complete reduction by hydrogen. Ordinarily this means a feed acid between 75 and 80 per cent titratable acidity.

Monsanto is stated to be able to supply designs for such plant of any given size and to guarantee its capacity with any given type of sludge. For its successful operation it requires a wet gas purification contact plant if the SO_2 is to be made into sulphuric acid.

Smokeless Fuel

A proposal by Salford Corporation to use its statutory powers to establish smokeless zones in the city, in which only smokeless fuel would be permitted to be delivered to domestic users, will be watched with interest. On the post-war housing estates of Salford dwellings have been provided with grates specially designed to burn smokeless fuel, and it is suggested that these areas shall be extended and restricted by law to the use of such fuel. The prime difficulties in connection with this scheme have been brought to the Salford Corporation's notice by coal merchants, whose co-operation was sought. These are stated to be that smokeless fuel is available only in limited quantities, also that Coalite—the potential solution of the problem—is expensive.

Monsanto-Ross-Wilde process for sludge acid recovery: combustion chamber and scrubbing tower (left), single decomposer unit (right), as added to an existing contact sulphuric acid plant (background)



STUDIES IN TANNERY CHEMISTRY

Some Vegetable and Metallic Processes Reviewed

AT the recent annual general meeting and conference of the Society of Leather Trades Chemists, held at Leeds University, papers were read of which the following summaries are representative.

"A New Method of Determining the Acidity in Tan Liquors and Its Application to Vegetable Tanning," by D. Burton, M.B.E.

Research work was being done to find methods of differentiating between the different kinds of acidity in a vegetable tan liquor. The aim was to get a better system of tanyard control by determining (1) the natural acidity, that is, acidity not due to the tannins, (2) the free carboxyl groups of the pyrogallol tannins, and (3) the phenolic hydroxyl groups of pyrogallol and catechol tannins. All the results are reported in mg. equivalents per litre of liquor. This will enable the tanner to ascertain what part the natural acidity plays in tanning and to follow the changes in the pyrogallol tannin contents of his liquors.

Determining Acidity

Previous work was reviewed and eight methods of determining acidity were studied. It is concluded that the Cameron-McLaughlin and ALCA official methods are not sufficiently accurate for determining natural acidity. An anion exchange resin method was described which gave promising results for the natural acidity. Titration of the undiluted liquor to pH 6.5 (or a little below 6.5) gives the natural acidity plus that due to the carboxyl groups of the pyrogallol tannins. Thus the latter can be obtained by difference. It is necessary also to differentiate between the salts of weak acids (buffer salts) and the salts of strong acids.

Buffer salts are determined by titration to pH 2.0 and by the alkalinity of the ash method, which is considered more accurate. The total salts are determined by the Cheshire-Brown-Holmes method, and by estimating the SO_4 in the sulphated ash of the liquor. The Procter-Wilson theory of vegetable tanning was discussed.

It was shown that dry-pelt can contain as much as 24 per cent Wilson-Kern fixed tannins when tanned with pure gallotannic acid in the absence of natural acids. Gallotannic acid contains no carboxyl groups but a large number of hydroxyl groups like a catechol tannin. It was concluded that tannin is fixed by the following reactions: (1) direct fixation without the intervention of natural acids, (2) indirect fixation when the pelt first combines with the natural acids, and

possibly by (3) hydrogen bond fixation. The causes of the unaccounted for loss of tannin in making leather were discussed.

"Solubility and Other Studies on Quebracho Extract," by T. White.

Examination of the solubility curves of a mixture permits determination of the number of components in the mixture, the solubility of each component, and the extent to which each component is present in the mixture. This technique has been applied to several vegetable tannin extracts. In the case of quebracho extract, the method shows that the extract contains five major components and a quantitative separation of the components can be based on the data from the solubility curves.

Light absorption and refractive index curves confirm this finding. The solubility curve method can be co-ordinated with results obtained by filter-paper partition chromatography, and new developments of this latter technique were described. These show that one of the main components of quebracho extract is itself complex and consists of probably eight flavone-like substances. The general finding is that the tannin extract is extremely complex and probably contains four types of tanning agents, a result which is important in relation to earlier speculations as to the structure of quebracho "tannin."

"Recent Studies of the Chemistry of the Liming Process," by Joane Bowes.

Recent work on the chemistry of the liming process was discussed. In liming, a variety of factors must be considered: (1) removal of hair, (2) chemical action of the alkali on the skin collagen and other proteins such as elastin and reticulin and (3) physical actions on the skin, such as swelling and opening up.

Acidity

Removal of the hair is dependent on the breakdown of the disulphide link in the keratin molecule; this is favoured by increase of hydroxyl ion concentration and of unhairing agent. Recent views on the mechanisms of the reactions involved were discussed.

Chemical action on the skin collagen is comparatively small except at pH values above about 13.0. Hydrolysis of amide groups is the chief reaction involved, and modification of the guanidine groups of arginine occurs to a very small extent. There is some breakdown of peptide links, including those involving proline and hydroxyproline, and a little collagen is dissolved.

The uptake of water from solutions of sodium and calcium hydroxide and from sodium hydroxide-sodium chloride, calcium hydroxide-calcium chloride and calcium hydroxide-sodium chloride systems was considered. Dr. Bowes concluded that decrease in cohesion of the collagen as well as osmotic effects plays an important part in determining water uptake. High pH values and the presence of salts favour decrease in cohesion.

"Scientific Experience," by R. H. Marriott.

The assessment of quality and its maintenance had, in the past, been dependent upon the judgment of the experienced craftsman. His standards, which are mental ones, are derived by means of sight, feel and taste. Although such an assessment is purely a qualitative one, it does enable a random batch of samples to be arranged in an order of goodness which finds general but not, perhaps, universal agreement not only with those who handle the product as part of their business, but also with the ultimate consumer.

The impact of science has led to an attempt to evaluate quality in terms of figures which should give a degree of preciseness which heretofore was lacking. It is an unfortunate fact, however, that many of the laboratory methods of assay, especially those used for purposes of process control, are not so comprehensive as those employed by the practical expert, and owing to randomness of quality often coupled with large and indefinable experimental errors, the values are prone to lose a great deal of their meaning.

In order to combat this weakness of the scientific approach, it is vital that the

scientist handles his data in a proper manner, remembering that if science is to cut out the personal factor and is thus to become the means by which experience can be registered in definite steps of value, then the scientific data must be dealt with as a coherent collection of facts, and not as a multiplicity of isolated figures.

"Recent Studies in Chrome Tanning," by Prof. Edwin R. Theis, Division of Leather Technology, Institute of Research, Lehigh University, Bethlehem, Pennsylvania.

The subject matter was given in two parts. The first part covered certain studies relative to the basic and dicarboxylic acid content of collagen and the effect of the depilation process upon these constituents. In addition certain swelling data were given relative to the plumping obtaining within the skin itself.

The second part of the talk dealt with the layerwise (stratiassessorgraphic) distributions of the various constituents in tanned and untanned animal skin. Layerwise distribution of the various constituents of vegetable tanned sole leather, of formaldehyde tanned leather, of iron tanned leather and of chrome tanned leather was shown by means of slides. In addition the layerwise distribution of salt and natural fat of cured stock was shown and the change in natural fat of the animal skin followed through the processes of depilation, bating, pickling and tanning.

The data given will be of value both to the research chemist and to the production man, and will be, it is believed, of real value in assessing many of the qualities of finished leather, especially if such work is tied in with the so-called photomicrographical assessment data.

Scottish Industrial Projects: Full Support by Authorities

GRANGEMOUTH Town Council is preparing to house the largest industrial development ever scheduled for the area and has been given priority facilities by the Government to enable adequate location of the industries involved. These are the £11 million expansion programmes of I.C.I. Dye-stuffs and Scottish Oils and the new petroleum-chemicals project sponsored jointly by the Distillers Co., Ltd., and the Anglo-Iranian Oil Company.

To accommodate the new workers some 900 houses are being scheduled in the burgh; the Department of Health, the Ministry of works and the Air Ministry have all given facilities to enable early construction of these houses.

The adjacent town of Falkirk is to share

in this expansion. There the British Aluminium Co., Ltd., will carry out an extension costing some £500,000 and thus still further establish Falkirk as a major centre of the foundry and aluminium industry. Here, and in other areas, a main problem of industrial development is the provision of adequate housing. New houses will go largely to key workers who will be brought in from other areas.

Another project, now in the development stage, involves re-opening of steel industry activity at Mossend. The Colville works there have been relatively idle since the end of the war and have been partially occupied by the Ministry of Works. Colvilles, Ltd., have now asked the Ministry to vacate the plant.

Dutch Insecticides and Fungicides

A Progressively Expanding Industry

A RECENT official survey furnishes some data about the relatively rapid development of these industries in Holland. From the Dutch standpoint, this publication is timely, having in mind the general aim, stimulated by the encouragement provided by ECA condition that the recipients of Marshall Aid should strive to intensify their home production and thus strengthen their economic independence.

Arsenate Products

It appears that calcium arsenate, which serves to fight the potato plague of the colorado beetle, is at present being turned out in adequate volume at Arnhem, and some of it elsewhere. Production of lead arsenate does not yet appear worth while, its consumption in Holland thus far amounting only to some 200 tons a year, compared with 1000 tons of the calcium chemical, of which Holland has become an exporter.

On the eve of the war Britain and Belgium were among the principal suppliers of calcium arsenate. The arsenic needed is met partly from a by-product of the well-known tin smelter of Arnhem, but the supply has still to be supplemented by importation of trioxide of arsenic.

The less hazardous fluorine poisons are being produced at Vlaardingen and Utrecht, and the basic material is obtained from superphosphate factory production. The use of fluorine insecticides in Holland itself is negligible, while, according to *Economic Information*, they are applied in the tobacco farming of the Netherlands Indies. Barium chloride for the making of fluorine insecticides has still to be imported.

Prussic acid is made in a factory at Dordrecht near Rotterdam at a rate of 3 kg. a week. The gas is handled and carried in high pressure "bombs," this method having been especially evolved here. It is claimed that Holland is the only country in the world to use this method. Prussic acid is being produced, as far as Europe is concerned, in Britain, Spain and Holland only at present.

Lack of "bombs" and of other adequate packing materials is an impediment to a quickening of development in kindred fields. Soviet Russia has shown some interest for Dutch-produced prussic acid.

Concerning "contact" poisonous material as opposed to the above-named "stomach" poisons, it is reported that DNOC, a sodium salt, is being made at Delden, home produced orthocresol furnishing the basic com-

pound. The manufacture of the salt ammonia at Delden commenced during the second world war. It is handled in paste form and, moreover, the manufacturing firm has patented a special procedure of pressing the product (a powder) into small blocks of 250 gm. each which are easily soluble in water. It is used in rose nurseries, arboriculture (in place of Carbolineum), etc., to the extent of 350 tons annually. Some quantities of orthocresol still need to be imported from Britain for this manufacture.

Another factory, situated at Krimpen-on-Lek, has resumed the making of DNOC, but recently the plant has been removed to Doesburg. This insecticide has proved its efficacy also in destroying weeds in grain and flax.

The Dutch production of nicotine is not sufficient to meet the national needs. The two factories of Oud-Gastel and Wormerveer supply only 6000 tons, so that the use is restricted to greenhouses. The inadequacy of the nicotine supply is curious if one thinks of the extensive production of leaf tobacco in the Netherlands Indies. The Wormerveer factory will, it is hoped, double its output of nicotine by the beginning of next year.

Rotenon base insecticides (derris and lonchocarp roots) are produced in Appeldoorn, Hoogkerk, Groningen, Rotterdam and Tiel. Six firms supply hexachloride cyclohexane (666) in Holland (at Deventer, Diemen, Rotterdam, Linne-Herten, Weesp and Blaricum), while DDT is made at Oss, and hexaethyl tetraphosphate at Rotterdam.

Copper Sulphate Plan

Dealing with fungicides, the report says that schemes are taking shape to manufacture in Holland sulphate of copper as well as oxychloride of copper. It is hinted that a commencement will be made with this production at Hengelo this year. Apart from covering the home demand, these products will be exported as well. Britain and Belgium were suppliers of copper sulphate latterly on account of German inability.

Seed disinfectants on quicksilver basis can be readily exported as only 200 tons per annum are needed in Holland, while the production amounts to 1000 tons. Sweden, Denmark, Finland, Belgium and France are the chief outlets. Seed protecting compounds on a hormone basis are lately being produced at Amsterdam.

SCIENCE AND THE TEXTILE FIBRES

The Chemical and Physical Studies of Flax

THE prospect of substantial advances in linen textile technology arising out of chemical and physical studies and the increased use of chemical processing material was indicated in the first paper presented at the opening of the Autumn session of the London and South-Eastern Counties Section of the Royal Institute of Chemistry. The occasion was the presentation of a paper, "Research on Linen," by Dr. A. J. Turner, M.A., D.Sc., director of Research of the Linen Industry Research Association, and the discussion which followed.

Dr. Turner said that research on linen was primarily concerned with the preparation and properties and the various possible combinations and modifications of the natural fibre—flax. The most important research work on linen had been done some thousands of years ago when the fundamental principles of flax production, spinning, weaving, and bleaching had been discovered and developed. The recent scientific era had merely carried those principles further.

Various raw materials—flax among them—had had the scientific spotlight focused on them, and co-operative research associations had been set up to study them. The Linen Industry Research Association was thus founded in 1919, in the expectation that it would help the industry to reduce its costs and to improve its products and its conditions of work.

With lantern slides, Dr. Turner then briefly reviewed the present state of knowledge of the flax fibre. He contrasted it with cotton and jute in chemical composition and physical dimensions and properties, and sought to link these with one another, and with the form and structure of the fibres, taken either singly or in combination.

The Flax Structure

He emphasised the importance of the structure of a single ultimate flax fibre, as deduced from microscopical, chemical, and X-ray evidence. A single flax ultimate contains some 30 billion cellulose chain-molecules, and the structure suggested at increasing magnification was admittedly speculative and subject to correction, but was designed to present a complete picture of a single fibre.

Dr. Turner mentioned a number of points at which research of the Linen Industry Research Association had been of practical benefit in flax production, spinning, weaving, bleaching, dyeing, and finishing. New processes had been developed by which to bleach linen without damage, and new tests intro-

duced to control the operation at every stage; processes had been devised for getting bright colours on linen, with better penetration and improved fastness; and a new process had also been developed for crease-resistant finishes.

Dr. Turner concluded with a description of the situation and facilities of the Linen Research Institute at Lambeg, Co. Antrim, seven miles south-west of Belfast; this was illustrated by slides showing aerial views of the institute and "stills" of its laboratories and technological rooms.

Points of Discussion

In the discussion which followed, Mr. S. G. E. Stevens asked if in preparing flax for bleaching all the wax was removed, or whether the wax content of the fibre was merely reduced; and, in view of the affinity of flax for water, was the tearing strength of flax canvas after a period of exposure affected by mould growth? He asked also if any work had been done on the use of flax for the determination of auxins?

Dr. Turner said that the preparation of flax for bleaching was essentially a scouring process, and even the most effective treatment only reduced the wax content of the fibre to about one-quarter of its original value, although the subsequent bleaching reduced it still more.

With regard to mould growths, it had been suggested that flax would be more prone to mould attack than cotton; but work carried out in 1930 had shown that, provided the flax yarns had been boiled so as to have a residual alkali solubility of not more than 5 per cent, trouble due to mould growths was not likely to be experienced.

The suggestion that flax might be used in the determination of auxins was an interesting one, but no work had been carried to this end.

Dr. K. G. A. Pankhurst commented on Dr. Turner's statement that the flax fibre is highly organised, with a high proportion of crystalline material in the structure. He compared flax with animal fibres, e.g., collagen fibres, which also possessed highly organised structures in the natural state, but when subjected to any "man made" process rapidly degenerated into a disorganised state with a high proportion of amorphous material. He asked if the same process of degeneration was observed in the flax fibre?

Dr. Turner agreed that the cellulosic fibres do not appear to degenerate as readily as the

(Continued at foot of page 528)

Predicting Gas and Fluid Behaviour

Engineering Studies of Heat and Mass Transfer*

THE calculations of heat or mass transfer involve either empirical equations based on experiments and on dimensional analysis or theoretical equations. The empirical principles were applied to heat and mass transfer in regular and in random packings of towers and transfer equations valid for certain specified conditions were derived. The theories of turbulent flow given by Osborne Reynolds were extended by Prandtl and von Karman to the investigations of Stanton, Nickuradse and Fritsch on fluid flow in pipes. An analogy between the transfer of heat and the transfer of momentum is now discernible.

The theories were further advanced by the author to explain his results on the distillation of ethanol-water mixtures in rough and in smooth wetted wall columns. The results for smooth walls obeyed the Chilton-Colburn equation but those for rough walls showed an increased rate of transfer with a much greater pressure drop for which no existing theory applied.

The transfer resistance of the laminar and buffer layers and of the turbulent core were separately evaluated from theory and the transfer equations were simplified by the

substitution of values for the Schmidt and Prandtl numbers.

This further theoretical advance was applied to problems of transfer in packed towers for which published data existed. It was considered that the loss of energy due to the promotion of turbulence by the packings would not influence the heat and mass transfer from the fluid to the packed bed. The efficiencies of the various packings were proportional to the ratio of the observed to the calculated values of the transfer coefficients.

Experiments on porous "celite" spheres gave unity for this ratio, other less efficient packings gave lower ratios, pointing to poor gas or liquid distributions.

The theoretical equation based on velocity traverses in a uniform tube proved capable of predicting rates of heat or mass transfer in regular or random beds of packings with an accuracy at least comparable with that of the experiments.

* Abstract of a paper presented at a meeting at the College of Technology, Manchester, on October 9 of the Institution of Chemical Engineers, North-Western Branch: "Fluid Friction, Heat and Mass Transfer in Turbulent Flow," Mr. W. S. Norman, M.Sc.

SCIENCE AND THE TEXTILE FIBRES

(Continued from page 527)

animal fibres. Even after treatment with caustic soda in the mercerising process, the fibres still contained a high proportion of crystalline material. Rayon, however, contains only 25 per cent of crystalline material, and although its tensile properties may be improved by a stretching technique, this appears to be due to producing better orientation of the existing crystallites rather than an increase in the total number of crystallites present.

Mr. H. L. Bennister asked if synthetic detergents, finding increased use in the textile industry, had been investigated as possible materials for the processing of flax? Dr. Turner explained that although the possible use of synthetic detergents was being borne in mind, the final controlling factor in technological studies must always be the economic one.

At present alkali detergents such as soda ash and caustic soda were cheaper than the synthetic detergents and this militated against their use except for special purposes. However, if synthetic detergents could be produced at a competitive price there would no doubt be a future for them in the linen industry.

KIESELGUHR IN SOUTH AFRICA

THE diatomaceous deposits of South Africa, with special reference to kieselguhr, form the subject of Geological Survey Memoir No. 42, issued by the Union Department of Mines. The main section has been compiled by Mr. L. E. Kent, F.G.S., with a section on diatom flora by the late Dr. A. W. Rogers, F.G.S., F.R.S.

Up to 1942, nearly all the kieselguhr produced in the Union came from Bankplaats, some 300 miles east of Ermelo. Since then, other deposits have come into production or await exploitation; details are given of the prospecting work with results obtained, and estimates of possible reserves of diatomaceous earth.

Sections are devoted to imported kieselguhr and possible local substitutes, the mining of local deposits and preparing the infusorial earth for market are dealt with. The Union's output has increased from 240 tons in the first quarter of 1947 to 640 tons in the first quarter of the current year, according to figures of the Department of Mines.

American Chemical Notebook

From Our New York Correspondent

CHEMICAL process industries in the United States are working at a higher level than ever before with an annual output of \$30 billion, according to Sidney D. Kirkpatrick, editor of *Chemical Engineering*. In a semi-annual review of the industry Mr. Kirkpatrick reports that plant expansion has made good progress and most of the delay due to wartime shortages eliminated. Good prospects for the future are augured by research and construction programmes in hand and it is expected that production this year will exceed 1947 by at least 5 per cent. A notable trend in the industry has been the migration of process plants from the eastern seaboard to the south-west and far-west attracted by lower power and fuel costs, abundant raw materials and efficient transportation to growing markets in those areas. Growing industries which are increasing their chemical needs include plastics, rayon, fertilisers, paints, varnish and lacquer, petroleum, rubber, pulp and paper, and iron and steel.

* * *

The English firm William Butler & Company (Bristol), Ltd., distillers of tar and suppliers of rosin and petroleum since 1843, are to be represented in America by the Coal-tar Chemicals Corporation, New York City. A wide range of coal-tar chemicals of British manufacture will thus be distributed in the United States by the corporation, which will carry on its regular business as before.

* * *

Plutonium, the man-made element in the atom bomb, is now being produced at the Government's plant, Hanford, Washington, on a factory-scale, according to Mr. David E. Lillenthal, chairman of the United States Atomic Energy Commission, in his address to the Executives' Club, Chicago. Their city, he said, had become a major atomic research centre. The cost of the new home of the Argonne laboratory would represent an investment of about \$60 million. Reactors planned for Argonne included atom power plants for propelling ships and naval vessels. Meanwhile, in St. Louis, Missouri, Mr. C. L. Karl, area manager for AEC, announced a modernisation and construction programme costing \$2.5 million has been started at the Mallinckrodt chemical works for the better processing of uranium materials.

* * *

Methods for safe handling and storage of hydrofluoric acid are set out in chemical

safety data sheet SD.25, the 25th of a series of manuals published by the Manufacturing Chemists' Association Inc., Washington, D.C. Hydrofluoric acid, an extremely hazardous material, was marketed 25 years ago in wax bottles, generally found only in laboratories, whereas to-day the anhydrous and aqueous acids are commonly shipped in tank car lots, and are widely used in the chemical industry.

* * *

Production of primary aluminium in the United States in July was 52,937 tons, a gain of 9 per cent over the previous month according to the U.S. Bureau of Mines. Imports of aluminium ingot were 5886 short tons, receipts from Canada being below the average, but increased shipments from Europe (mainly from Switzerland), helped to meet the deficit. Exports during July were also lower than June, the principal recipients being Asia, South America, and Africa.

* * *

Commercial production has been started by the Carbide and Carbon Chemicals Corporation of three new glycols, butanediol-1,3, 2-methylpentanediol-2,4, and octylene glycol, which have been found effective as plasticisers for animal glues, casein, cork gelatine, polyamide resins and zein compositions, and useful as coupling or blending agents in textile, leather and metal cutting oils. Solvents for natural gums and resins, the new glycols are also described as useful as intermediates for alkyd and plasticisers for synthetic resins. This is believed to mark the first commercial production in the U.S.A. of butanediol, a mild-odoured, colourless liquid, miscible in all proportions with water and alcohol and less volatile and more viscous than its lower homologues, ethylene glycol and propylene glycol. The hygroscopicity of butanediol is regarded as being about 60 per cent of glycerol and three times that of octylene glycol. Derivatives are less water soluble and more soluble in hydrocarbons than those of ethylene glycol. Octylene glycol, colourless, is a 1.3 diol of low volatility and is said to be the first commercially available glycol having limited water-solubility. Its viscosity is much greater than that of the lower diols, but less than that of glycerol. It is about one-tenth as hygroscopic as glycerol at 65 per cent relative humidity and at 21°C.

S. American Coal and Steel

U.S.A. Aiding Big Production Schemes

NEW evidence of increasing interest and widening collaboration of the U.S.A. in the industrialisation of the Latin-American countries is contained in the announcement made last week in Bogota of the establishment of a coal mining and iron smelting corporation, the *Empresa Siderurgica Paz Del Rio*. Capitalised with the equivalent of about £14.5 million, of which the Colombian Government is providing 51 per cent and private investors up to 20 per cent, one of its chief intangible assets will be the technology and close collaboration of two U.S. companies, the Koppers Company, of Pittsburg, and the Freyn Engineering Corporation, of Chicago.

The Institute for Industrial Development which will provide part of the capital began the project in 1940 and estimates that production capacity of the new company will be 500 tons of iron a day for at least 50 years. The new company is the fourth enterprise of this type in Latin America, the Institute said. The others are in Mexico, Brazil and Chile.

The company's properties are located in the department of Boyaco and cover an area of 45 square kilometres where coal and iron will be mined. To aid the undertaking, the Government is making tax concessions and permitting free imports of materials and equipment.

300 Per Cent More Steel

Meanwhile, in New York, Virgil Stark, president of North American Utilities and Construction Corporation, addressing a meeting of the National Association of Steel Exporters, said that while the Argentine iron and steel production expansion programme provides for increasing steel making capacity by 300 per cent, it will even then cover only about 35 per cent of that country's domestic needs.

The Armeo International Company is building a steel plant at San Nicolas, Argentina, for an output of 400,000 tons per year in 1951. Mr. Stark told the exporters that the South American markets for steel and steel products presented a more stable and important long-term opportunity than European markets.

Literature describing a tin content indicator has been prepared by the Wheelco Instruments Company, 847 W. Harrison Street, Chicago 7, Illinois. The bulletin also provides a technical explanation of the method of determining the tin content of a solder batch.

Rubber Research in U.S.

Use of Radioactive Isotopes

FRESH methods for improving the vulcanisation of rubber by means of radioactive isotopes are now being used by the B. F. Goodrich Company as a result of work in their newly-completed research centre at Brecksville, Ohio. Three main kinds of radioactive isotopes are being used by the technical experts. They are:—

Radioactive sulphur to study the vulcanisation of rubber to determine the disposition of this vulcanising agent in the final product.

Radioactive iodine to measure the thickness of thin films in the neighbourhood of one micron, difficult to measure by more conventional methods; this is part of a study to determine the mechanism by which silicones reduce the adhesion of ice to rubber-like material and plays an important part in improvements to de-icers for aeroplanes.

Radioactive phosphorus for improving tests in abrasion and tyre tread wear. Dr. Howard E. Fritz, vice-president of the company's research, said that among the projects undertaken is one in which radioactive tracers are added to a chemical solution through which the tyre cords are passed, and radiographs reveal the amount of penetration and whether it is uniform.

In other uses, several radioactive chemical accelerators have been made, including zinc dimethyl dithiocarbamate, tetramethyl monosulphide, and tetramethyl disulphide for use in experiments in vulcanisation.

A number of interesting developments are expected from the discovery of beta-propiolactone, announced by John L. Collyer, president of the B. F. Goodrich Company. As a result of reactions with this new chemical, patents have been granted to the company for the production of new compounds estimated to produce a variety of end-products ranging from weed-killers and plastics to plant hormones and compositions which increase the wear-resistance of leather.

Scottish Hydro-Power Charges

The North of Scotland Hydro-Electric Board has stated that it cannot differentiate between industries in the rating of its power, no matter how desirable it may be that certain industries should be located in the Highlands. This follows the suggestion advanced by the Scottish Council (Development and Industry) that the establishment of electro-chemical and electro-metallurgical industries in the Highlands might be conditional upon their ability to obtain power as cheaply as it is offered in Norway or other foreign countries.

Technical Publications

OVERCOMING the difficulties of foaming is clearly and concisely set out in a booklet describing the uses of Antifoam A, a Dow Corning silicone product, distributed by Albright & Wilson, Ltd.

Antifoam A, an effective foam suppressor, is a colourless, translucent silicone compound which retains its honey-like consistency at temperatures ranging from -40° to over 200°C . (-40° to over 392°F). Physically inert, it is tasteless, but has a very slight not unpleasant odour. It may be taken internally in relatively large quantities without ill effect, and does not irritate the skin.

The most effective use naturally depends on the foamer involved. In some cases a portion of DC Antifoam A may be added before foaming starts, in others it may be added during the foaming, until the foam is suppressed. In most instances, however, the more convenient method has been found to add the silicone product dispersed in one of the solvents listed in the booklet.

Although the cost of Antifoam A is more than that of other foam suppressors, it is stated to be frequently more effective in smaller concentrations, and in many cases cheaper to use. Its usefulness has been established in laboratory distillations, processing of chemicals, in the paper and synthetic rubber industries, the manufacture of gums and synthetic waxes and in soaps and wetting agents.

* * *

James Wilkinson & Son, Ltd., Tinsley Park Road, Sheffield 9, has issued a new list in booklet form of some of their principal industrial chemicals, including hydrofluoric acid and a wide variety of fluorides. Data of approximate analysis, properties and uses are shown in tabular form.

* * *

German methods of producing iron powder in a ceramic tunnel kiln are described in an information circular by the Bureau of Mines as a supplement to four other Government publications describing the Bureau's research on brick-yard sponge iron. German methods of producing iron powder in a tunnel kiln are a further development of the process used commercially since 1911 at a ceramic plant in Hoeganaes, Sweden, and this process was further developed during the war by the Bureau of Mines, resulting in the adaptation of ceramic tunnel kilns to the solid-carbon reduction of iron ores. Highly technical, the circular

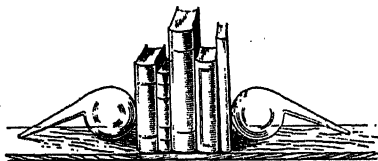
describes in detail the use of the German kiln and the costs of producing iron powder. Copies of the circular, No. 7473, may be obtained free from the Bureau of Mines, Publications Section, 4800 Forbes Street, Pittsburgh 13, Pa.



The portable model, less than 8 in. long and weighing about 7 lb., of the recording vibrometer newly produced by the (U.S.) General Electric Company. All vibration frequencies from 10 to 120 cycles per second in rotating plant are transmitted through the probe, amplified and continuously recorded on a waxed paper chart

Although the chemical industry has its own special fire hazards, the risk of conflagration arising from causes common to other industries are also continually present. It is to draw attention to these that "Fire Prevention Notes for Industrial Premises" has been issued by the Fire Protection Association. The booklet covers the many common causes of fires with sensible advice and information for their avoidance.

Economic Survey of Switzerland.—The latest volume in the series of Overseas Economic Surveys, published for the Export Promotion Department of the Board of Trade and available from H.M. Stationery Office (2s.) deals with economic and commercial conditions in Switzerland.



A CHEMIST'S BOOKSHELF

Electrolytic Polishing and Bright Plating of Metals. S. Wernick. (Foreword by Dr. U. R. Evans.) London: Alvin Redman, Ltd., 1948. 8vo. Pp. xv + 243; 30s. net.

Apart from the admirable survey of electrolytic polishing contained in the first section of the Proceedings of the 3rd International Electrodeposition Conference, recently published (*THE CHEMICAL AGE*, August 7 and September 4), this work by Dr. Wernick appears to be the first book in English to be published on the subject. It is, however, a relatively small book, and of the 175 pages of actual text—the remainder being appendix, bibliography, and index—about half are devoted to electrolytic polishing, and the other half to plating or deposition. It is, therefore, a comparatively expensive publication. Dr. Wernick is, however, one of the leading specialists in this particular field, and few could be more competent than he in critically surveying the great mass of periodical literature and patents, of which over 500 references are given; and in sifting out and concisely presenting the really important facts from a practical point of view. Thus we have a veritable *multum in parvo*. While interesting aspects of theory have by no means been neglected, the work is evidently intended both for the practical polisher and electroplater, and for the student about to enter the works or laboratory in this rapidly developing and highly important field of industry. It contains a brief and clear account of electrolytic polishing of stainless steels, carbon steels, nickel, aluminium, copper, silver, plating with bright nickel, copper and silver, deposition of precious metals—platinum, palladium, rhodium—and industrial applications of electro-polishing to non-ferrous metals. The appendix deals with bright nickel plating in America. There can be no question about the great industrial importance of this comparatively new method of surface finishing, compared with the much more laborious mechanical polishing; nor of the very keen interest evoked in engineering, metallurgical, and general scientific circles. But, as the author very truly points out, in early stages of development of new processes, the useful information which may be gleaned from voluminous dissertations is apt to be disappointingly small. In the present work he has there-

fore attempted to enunciate clearly the principles of electrolytic polishing and bright plating, so far as these are understood, and to give useful working details of established processes. In this he has very ably succeeded. An unusual and valuable feature of the bibliography is the inclusion of very brief abstracts with the more important references.

Dipole Moments—Their Measurement and Application in Chemistry. R. J. W. Lefèvre. London: Methuen & Co., Ltd. 1948. Pp. 117. 5s. net.

The volume is one of Methuen's monographs on physical subjects, a series intended to supply readers of average attainment with a compact statement of the modern position in each subject. The student and research worker in physical chemistry will find in this book expositions by an author who is actively engaged in research work on this subject and who, besides, was professor of chemistry at the University of Sydney. The contents are divided into six chapters, dealing with: dielectric polarisation and the calculation of dipole moments; practical methods for the measurement of dipole moments; solvent effects in dipole moment measurements; dipole moments and molecular structure: intramolecular rotation and flexibility of molecules; and some anomalous dipole moments. A table of dipole moments, a guiding index and a list of references are of great use for the study of the empirical connections between dielectric constants and other properties of chemical compounds, a branch of science which can be traced back to Faraday (1837) and other earlier literature and which, although given here in a concise form, is comparatively fully quoted and discussed for the reader's benefit.

The Textile Institute announces that it will publish soon an important work, "Fibre Science," dealing with the constitution, structure and behaviour of fibres. The work consists of a series of post advanced lectures delivered last winter at the College of Technology, Manchester, and is edited by Mr. J. M. Preston. It covers sixteen papers by distinguished scientists examining the physical and chemical characteristics of textile fibres.

Home News Items

New Chemistry Department.—The development of a full-scale chemistry and pharmacy department at Robert Gordon's College, Aberdeen, is indicated by the decision of the Scottish Education Department to sanction the expansion, the reason for which is given as "probable future development trends."

Giant Crusher for I.C.I.—On two days recently officials of I.C.I. limestone division stood on the steamship *American Veteran* at Manchester dock and watched the unloading of a 438-ton gyratory crusher. The crusher, built by the Traylor Engineering Co., Ltd., of Ohio, was ordered to meet the increasing demand for limestone. For the sea voyage from New York it was split into more than 60 different parts.

Scottish Gas Turbine.—"In Scotland, the first trials of an open-cycle gas turbine have already taken place, and a gas turbine capable of developing 12,500 kilowatts for land use is now under construction," said Dr. James M. McNeill, assistant managing director of John Brown & Co., Ltd., Clydebank, in his presidential address, in Glasgow recently, to the Institution of Engineers and Shipbuilders in Scotland.

Britain's Coal Production.—The total output of coal in Britain last week was 4,153,500 tons (deep-mined 3,917,400 tons, open-cast 236,100 tons). This was the highest total for four weeks and was an increase of 30,200 tons over the previous week. The total production, however, fell short of the weekly average of 4,336,000 tons of deep-mined coal, necessary until the end of the year if the target of 200 million tons is to be reached, by 418,000 tons.

Tender for Shares.—Tenders for the purchase of shares, subject to direction of the Custodian of Enemy Property in England, are invited by the Board of Trade for the following companies: (1) Nitsche & Gunther British Optical Company, Ltd., manufacturers of spectacle lenses, frames, and all types of accessories. Share capital: Nominal £51,686. Issued: £43,487, in ordinary shares of £1 each fully paid. Offered for sale: 29,637 ordinary shares of £1 each fully paid. These shares were previously offered in July, but withdrawn on representation of several interested parties that insufficient time had been given. (2) St. Andrew Mills, Limited, manufacturers and producers of cellulose, wadding, crepe, tissue, and other light tissues, etc. Share capital: Nominal £120,000. Issued: £90,001, in 90,001 shares of £1 each fully paid. Offered for sale, 12,000 shares of £1 each fully paid.

River Pollution.—The Lune Board of Fishery Conservators has approved a recommendation of its Pollution Committee that legal proceedings should be instituted against the Lancaster Corporation for an injunction and costs in respect of damage to fishing reaches at Skerton caused by pollution from the corporation's pumping station.

Outside Chemical Vat.—Robert Airey and Son, Ltd., King's Bridge Road, Huddersfield, who are among the largest vat builders in the country, have under construction, for use in the chemical industry, a wooden vat of 30,700 gal. capacity. Made from three-inch timber, it is 28 ft. in diameter and 8 ft. deep. It will weigh over eight tons when empty. The largest vat ever made by the company was 35 ft. in diameter, holding 75,000 gallons.

No Housing Priority for Industry.—Morecambe Town Council Housing Committee, after studying a request from the general manager of the Shell petroleum refinery at Heysham for the allocation of council houses for key personnel at the factory, has decided to adhere strictly to the allocation of houses on an approved "points" system and to give no preference to industrial priorities. The Shell application was supported by a letter from the Ministry of Fuel and Power.

International Meeting of Leather Chemists.—Belgium, Great Britain and France were elected founder members of the International Union of Leather Chemists at the recent meeting at Leeds University of the provisional executive committee. Applications for admission have been received from Holland, Italy, and Switzerland. An invitation from the French Society of Leather chemists to hold the international conference in Paris in September, 1949, was accepted.

Coke Oven Gas for Steel Industry.—The opinion that Glasgow Corporation should utilise a daily surplus of 1 million cu. ft. of coke-oven gas said to be available at Dumbreck Colliery, Kilsyth, is expressed by Councillor Victor D. Warren, chairman of the Progressive Party in the Corporation, in a letter to the Lord Provost (Sir Hector McNeill), in which he says: "It is fully admitted that the question of obtaining surplus coke-oven gas is one for the steel industry, and the likelihood is that the Scottish steel industry will require and use any surplus which it manufactures in the course of its operations."

PERSONAL

DR. L. WHITBY has been appointed director of the Paint Industries Research Institute, Durban, South Africa, and is consequently relinquishing his post of chief research chemist to High Duty Alloys, Ltd. Dr. Whitby was for several years head of the technical division at the Paint Research Station, Teddington.

Thos. W. Ward, Ltd., has appointed as additional local directors—MR. C. PARRY, MR. D. F. WALTON, MR. W. HALL and MR. H. H. MUMBY. Mr. Parry and Mr. Mumby have for many years been closely connected with the company's shipbreaking activities, and Mr. Hall with scrap iron and steel. Mr. D. F. Walton, son of the assistant managing director of the company, is connected with the company's activities as railway siding consultants and contractors.

President Truman has appointed DR. KARL T. COMPTON, the American physicist, as chairman of the Armed Services Joint Research and Development Board. Dr. Compton will replace DR. VANNEVAR BUSH, chairman since 1946.

MR. H. TILSLEY has been appointed assistant sales manager (export) of the British Aluminium Co., Ltd., as from October 1. MR. W. H. MARSTON is relinquishing his position as manager of the Leeds branch office, and will be transferred to London branch office on November 1. MR. A. E. HEELEY has been appointed manager of the Leeds branch office from the same date.

MR. NORMAN AUBREY DORE, of Kingsgate Bay, Kent, who left £6490, bequeathed the residue of his estate, after certain bequests, to the Royal Metal Trades Benevolent Society, of which he was chairman.

Frozen Food Investigation

To secure the fullest co-operation and collaboration between the various research organisations engaged in the field of food and to ensure that inquirers will be directed to the best sources of information, the Frozen Foods Consultative Group was set up last year and is now announced for the first time. This is an informed group consisting of representatives of research organisations official and semi-official, under the chairmanship of the Director of Food Investigation, Dr. Franklin Kidd. It will collaborate with seven of the principal research organisations and has power to invite to its meetings representatives of other bodies. The secretary of the group is Mr. P. R. P. Claridge, Food Investigation Organisation, Lloyd's Bank Chambers, Cambridge.

METAL PRICES RAISED

THE maximum prices of copper, lead, zinc and zinc products, and aluminium, have been raised as from October 1, states the Ministry of Supply, the new maximum prices per ton being:—

Electrolytic copper, £140, an increase of £8; good soft pig lead, £112 (+£22); good ordinary brand zinc, £92 (+£17); zinc sheets, £104 (+£17); zinc oxide (white seal), £89 15s. (+£14 5s.).

Virgin aluminium in ingot form is advanced from £80 to £87 a long ton, delivered consumers' works, with an addition of £2 10s. for metal in notch bar form.

All these increases are stated to be due to the high cost of imported supplies.

Wolfram ore was quoted in London last week at 105s. to 112s. 6d. a unit, c.i.f., European ports, compared with 102s. 6d. to 110s. previously. Tungsten ore has been raised from 102s. 6d.-110s. to 105s.-112s. 6d. a unit.

Steel Industry's New Record

The highest September rate of output ever achieved was reached by the steel industry last month, with a total at the rate of 15,435,000 tons a year.

It now seems more than probable that the steel workers will beat the stiff 1948 production target set by the Government of 14,500,000 tons. The only danger is the failure of supply of raw materials; more scrap than ever is required.

Record Bauxite Figures

Domestic mine production of bauxite in the U.S.A., 367,973 long tons, established a new post-war record in the second quarter of 1948, increasing 21 per cent over first-quarter output, according to U.S. Bureau of Mines. Imports of bauxite, 604,337 tons, were also greater, reaching the highest level recorded, so that the net total new supply of bauxite was 10 per cent greater than in the first quarter, and was also a new record. Mines in Arkansas furnished almost 95 per cent of the domestic total.

Plastics Information Service

A new information service dealing with the application and fabrication of laminated plastics will be inaugurated shortly by the design section of De La Rue Insulation, Ltd. This is the latest activity of the section, which was set up after the war to assist architects, designers, builders, shop fitters, furniture makers, bar fitters, transport undertakings, hospitals, stores, etc., on any problems related to the use of Formica and other De La Rue laminated plastics.

Overseas News Items

Malayan Tin Exports.—September shipments of tin from Malaya showed an increase of 1363 tons more than the previous month, the total of 5782 tons being the highest monthly figure since April this year, following the raising of the official price.

Research Work Destroyed by Fire.—The cosmic ray laboratory of Melbourne University's physics school was severely damaged by fire on October 6. This was the second outbreak in less than a week, and the result of two years' research, which was nearing completion, was destroyed.

New Portuguese Chemical Company.—The Companhia Portuguesa de Fornos Electricos S.A.R.L. has been formed during August with a capital of Esc.6,000,000,000. It proposes to erect a plant for the manufacture of calcium carbide, calcium cyanamide and other compounds, states the Dutch paper *Economische Voorlichting*.

Tin Study Group.—Proposals for the reorganisation of the International Tin Study Group are likely to be put forward by the Belgian representative at the next meeting on October 25 at Scheveningen, Holland. The reconstitution is suggested following complaints that under the present system consumers have an undue advantage over producers.

U.S. Steel Shortage.—Demand continues to exceed supply in the American steel industry, particularly for plates, sheets, strip, bars and some wire products, and it seems improbable that the tonnages required for the final quarter of the year will be obtained. At the current rate of production it is estimated that U.S. steel output should reach approximately 88 million tons this year, and the accumulation of orders should be overcome by the end of next year.

Aid to Canada's Textile Industry.—Of considerable interest to Canadian textile processors is the announcement that the widely-used water-repellent finish, Aridex, will soon be made in Canada by the chemicals group of Canadian Industries, Ltd. This product, previously imported from the U.S.A., will be manufactured at Shawinigan Falls, Quebec, and production is now beginning. Aridex products in various concentrations can be readily applied by one bath treatment to silk, viscose rayon, cotton, cellulose acetate, wool or nylon, the manufacturers claim.

Soviet Seeking Rubber.—Russia, reported recently to be purchasing a large part of Malaya's rubber output, was stated authoritatively last week to have offered to buy Ceylon's rubber crop for 1949 and current stocks available now.

Another Atomic Laboratory.—A powerful instrument of nuclear research was dedicated at the U.S. Cornell University by Prof. I. Rabi, of Columbia University, on October 8. There is a \$2 million laboratory with a synchrotron capable of developing 300 million electron volts for nuclear fission. The synchrotron is expected to bring new knowledge of the meson.

Industrial Diamonds for U.S.A.—The purchase in Britain of a substantial quantity of industrial diamonds for the United States Government stockpile has been announced in London by Mr. Thomas R. Finletter, leader of the Economic Cooperation Administration mission to the United Kingdom. The diamonds were bought from the Industrial Distributors' (Sales) Corporation.

Petrol from Vegetable Oils.—A process for the production of petrol direct from cotton seed has been established by the East African Agricultural Research Institute. This information is revealed by the report of the Indian Government Trade Commissioner in East Africa for the year 1946-47, which states that the process is protected by a British patent which has been placed on the secret list. Since the extraction of edible oil from the available cotton seed is a priority demand, no steps have yet been taken for the commercial production of petrol.

Australian Zinc.—Mainly due to the increased production from Mount Isa mines, Queensland, the output of zinc in Australia is expected to rise to the pre-1943 average of 230,000 tons a year. The present production is 170,000 tons, of which 80,000 tons is in the form of electrolytic zinc from works at Risdon, Tasmania, the concentrate being obtained from the Broken Hill mines, New South Wales, and Read-Rosebery mines, Tasmania. These works have a total capacity of electrolytic zinc of 96,000 tons, which with the Mount Isa increased production will make about 150,000 tons of concentrate available for export.

Next Week's Events

MONDAY, OCTOBER 18

Royal Institute of Chemistry (London and South-eastern Counties Section), Dartford, County Technical College, Essex Road, 6.30 p.m. A. E. J. Pettett: "Effect of Cyanides on Treatment of Sewage in Percolating Filters."

Electrodepositors' Technical Society, Northampton Polytechnic, St. John Street, Clerkenwell, E.C.1. G. E. Gardam and J. F. Mills: "The Surface Appearance of Polished Metals—Physical and Psychological Considerations."

Society of Chemical Industry (Chemical Engineering Group), Geological Society, Burlington House, London, W.1. 5.30 p.m. R. S. Morse: "Recent Developments in High Vacuum Technology."

The Chemical Society (Oxford), Alembic Club lecture. Physical Chemistry Laboratory, South Park Road. 8.15 p.m. Dr. A. D. Walsh: "Aspects of Vapour Phase Oxidation."

TUESDAY, OCTOBER 19

The Chemical Society (Southampton), Joint meeting with Portsmouth and District Chemical Society, Municipal College, Portsmouth, 7 p.m. Dr. F. P. Bowden: "Tribochemistry and the Initiation of Explosives."

Society of Dyers and Colourists (Huddersfield section), Field's Cafe, Westgate, Huddersfield. 7.30 p.m. D. R. Lemin and I. D. Rattee: "The Levelling Properties of the Acid Dyes—Quantitative Migration of Dyes."

WEDNESDAY, OCTOBER 20

Royal Institute of Chemistry (London and South-Eastern Counties Section), Royal Society of Medicine, 1 Wimpole Street, London, W.1. 6.30 p.m. Dr. J. G. Fife: "Protection of Chemical Inventions."

The Fertiliser Society, 44 Russell Square, London, W.C.1. 2.20 p.m. A. E. Snell and E. P. Hudson: "Tennessee Valley Authority's Activities and their bearing on Phosphatic Fertiliser Technology."

Irish Chemical Association, Trinity College, Dublin. 7.45 p.m. Prof. Wheeler: "The Training of a Chemist."

Manchester Federation of Scientific Societies. Institution of Structural Engineers, College of Technology, Manchester, 7 p.m. W. Bates: Chairman's address, and "Design for Arc Welded Structures." (Technical film).

Manchester Metallurgical Society, Engineers Club, Manchester. 6.30 p.m. A. H. Goodger: Presidential address.

THURSDAY, OCTOBER 21

The Chemical Society, Edinburgh. Joint meeting with local sections of Royal Institute of Chemistry and Society of Chemical Industry. North British Station Hotel. 7.30 p.m. Prof. J. W. Cook: "Some Aspects of the Chemistry and Biochemistry of Polycyclic Aromatic Hydrocarbons."

The Chemical Society (Hull). Joint meeting with University College Scientific Society and local sections of Oil and Colour Chemists' Association, University College. 6 p.m. Dr. A. E. Alexander: "Surface Chemistry—Its Achievements and its Future."

Textile Institute (Lancashire Section), Manchester. 7.15 p.m. H. W. Best-Gordon (Courtaulds, Ltd.): "Chemical Aids to Textile Processing and Finishing."

FRIDAY, OCTOBER 22

The Chemical Society, Birmingham University, Edgbaston. 4.30 p.m. Sir Cyril Hinshelwood: "Cell Growth Phenomena and Chemical Kinetics."

WHY OUTPUT FALLS

THE great reduction of productive effort and the psychological and economic forces which had contributed to bringing it about were the subject of an address by Sir Ernest Benn, president of the Society for Individual Freedom, at the first of the autumn series of members' luncheons held at the Connaught Rooms last week.

Taking as his subject "The State Cannot Do It," Sir Ernest Benn said that man-hour output in industry was calculated by some to be half what it was in pre-war days. Figures from the Ministry of Health disclosed that in the building trade man-hour output was one-fifth of what it was before the war.

Now we had 45 million or more people, each forced to conform to a plan, each enjoying social security and full employment with little or no risk and no necessity to give satisfaction to anyone. What we did not get was output; the standard of living was going down and we were getting nearer every day to the condition of starvation. He suggested that in that circumstance we were witnessing the biggest psychological blunder in all history—complete misunderstanding of human nature and complete undervaluation of the quality of the human being.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

INTERNATIONAL ELECTRONIC CORPORATION, LTD., London, S.W. (M., 16/10/48.) September 10, £400 debentures, to S. Remenant, London; general charge. *Nil. Dec. 31, 1946.

THERMIONIC PRODUCTS, LTD., London, E.C. (M., 16/10/1948.) September 15, charge, to Midland Bank, Ltd., securing all moneys due or to become due to the bank; general charge. *Nil. April 28, 1948.

Satisfaction

WM. BOWKER & SONS, LTD., Sheffield. (M.S., 16/10/1948.) Satisfaction, September 11. £3500, registered July 3, 1937.

Company News

H. Stout & Co. has been formed into a limited company under the title of **H. Stout & Co., Ltd.**

The nominal capital of **Chegwyn Rawson Research Laboratories, Ltd.**, 105 Station Road, Edgware, has been increased beyond the registered capital of £1500 to £3500, in £1 ordinary shares.

New Companies Registered

Tutkdean Ltd. (459,844).—Private company. Capital £100. Directors: A. Monteith, C. E. J. St. John Evers, E. Wall, W. Leyland and A. G. F. Leather. Solicitors: Greenwood Milne & Lyall.

Riley's (Shepherds Bush), Ltd. (459,572).—Private company. Capital £4000. Manufacturing or wholesale or retail chemists. Directors: C. F. Casey, A. L. Jones. Reg. office: 20 Shepherds Bush Road, W.6.

Horn Construction Co., Ltd. (459,610).—Private company. Capital £1000. Constructional and chemical engineers, manufacturers of alloys, oils, chemicals, and manures. Directors: T. Horn and E. E. Horn. Reg. office: 114 Victoria Avenue, Grays, Essex.

Astra Chemicals, Ltd. (458,863).—Private company. Capital £1000. Manufacturers, exporters and importers of chemicals, gases, drugs and medicines, etc. Directors: A. R. Baker, H. A. Hann. Reg. office: Astra House, Midsomer-Norton, Som.

C.S.A. Chemical Company, Ltd. (459,639). Private company. Capital £1.0. Manufacturing, research, dispensing and analytical chemists. Directors: C. W. J. Arber, W. H. Claringbould and G. H. Smallwood. Reg. office: 9 Glenthorne Gardens, Ilford.

Controlathe Co., Ltd. (459,638).—Private company. Capital £100. Plastic moulders and mould makers, electronic and chemical research engineers. Directors: G. M. Baigent. Reg. office: Swinton House, 324 Grays Inn Road, W.C.1.

Stonehouse Tablet Manufacturing Co., Ltd. (459,627).—Private company. Capital £5000. Drysalters, manufacturing chemists. Director: G. Stonehouse. Reg. office: Oaklea Mills, Oakleys Road, Long Eaton, Derbyshire.

Garston Bottle Co., Ltd. (459,009).—Private company. Capital £450,000. To acquire the business of glass makers and dealers carried on by G B C Vendors, Ltd. Directors: W. D. Redmond, W. A. O'Reilly, F. G. Macalpine, J. J. Calder, G. C. M. Barlow, J. M. Barlow, J. W. Joyce and R. H. C. Whiteway. Reg. office: Off Window Lane, Garston, Liverpool, 19.

Chemical and Allied Stocks and Shares

A PART from continued strength of British Funds, stock markets have been only moderately active and price movements showed no particular trend, although in the industrial sections individual features were not lacking. Sir Stafford Cripps's reference to iron and steel was taken in the market as indicating that the iron and steel nationalisation Bill is to be introduced shortly by the Government. Nevertheless, it is still assumed that in any event, nationalisation cannot be effected before 1950.

Shares of chemical and kindred companies have been firm and inclined to be more active, because in many cases the companies are playing an active part in the export trade drive. Moreover, rearmament will, in some cases, also mean more business. On the other hand, it is pointed out that dividend limitation prevents the payment of higher dividends.

Outstanding feature has been continued demand for Imperial Chemical, which have risen further to 47s. 3d. with the new shares

(20s. paid) at 26s. 9d. It is being pointed out in the market that there is still a not unattractive yield compared with the return on other leading industrial shares, and that the directors have stated that they expect to be able to maintain the 10 per cent dividend in future on the larger capital. Elsewhere, Monsanto Chemicals have gained 1s. 3d. at 60s., Fisons were 59s., and Albright & Wilson 29s. 3d., while Laporte Chemicals 5s. ordinary changed hands around 20s. 9d. Borax Consolidated firmed up to 60s. 6d. at which there is a yield of $4\frac{1}{2}$ per cent on the basis of the $12\frac{1}{2}$ per cent dividend, which the market is confidently expecting to be maintained. At 47s. 6d. British Aluminium have been firm, awaiting details of the expected £1,500,000 issue of 3 per cent debentures. United Molasses improved to 47s. 10 $\frac{1}{2}$ d., Turner & Newall were 77s. 1 $\frac{1}{2}$ d., and British Oxygen steady at 98s. 1 $\frac{1}{2}$ d.

British Oxygen is among leading industrial companies which have stated that in due course more capital will be required for expansion of the business. Results of British Celanese are due shortly, and there are rumours that more capital may also be needed in this case, which it is being suggested in the market, might be obtained by the issue of further preference shares. It is believed in the City that many important new issues are held up for the time being, awaiting a better turn in international affairs and a return of more active markets.

Shares of companies with coke ovens have remained speculatively active on market estimates of "break-up" values, but the value of the shares will in most cases turn on the amount actually offered by the National Coal Board for the coke oven assets of individual companies. British Benzol fluctuated sharply and are 91s. 3d. at the time of writing, with Benzol and By-Products at 12s. 9d. Staveley were active again on market hopes of prospects of a part return of capital and have risen further to 89s.

In iron and steels, Baldwins (Holdings) 4s. shares were steady at 9s. 6d. following satisfaction with the maintained 16 per cent dividend. Guest Keen were 48s. 6d., United Steel firmed up to 29s. 7 $\frac{1}{2}$ d., awaiting the financial results, while Babcock & Wilcox were good at 72s. with Stewarts & Lloyds at 56s. Colvilles at 38s. were good following the interim dividend. In other directions, Boots Drug changed hands around 52s. 6d., Sangers were 30s. 9d. with Beechams deferred at 18s. 6d., and British Drug Houses 5s. shares 9s. 6d. Glaxo Laboratories were £18 $\frac{1}{4}$. British Glues & Chemicals 4s. shares were 20s. Oils moved narrowly, Shell and Anglo-Iranian easing to £8 5/16 and 75s. respectively.

British Chemical Prices

Market Reports

PRESSURE for supplies characterises most sections of the industrial chemicals market, although delivery specifications under existing contract commitments are being met with satisfactory promptness. Inquiries for shipment have again been on a good scale, with buyers rather more insistent on firm delivery dates. The main price changes have been in the non-ferrous metal compounds as a result of the metal price increases, and, following the rise in the lead oxides, reported last week, an advance of £14.15 per ton in the price of zinc oxide has been notified. The copper compounds are also dearer. In the soda products there has been no improvement in the soda alkalis position, and chlorate of soda supplies are barely sufficient to meet current requirements. The potash chemicals are firm and available parcels are quickly taken up. Business in the coal tar products has been good with the home and export demand for pitch on a good scale. Xylol supplies are a little easier and it is contemplated that export licences will be granted for limited quantities.

MANCHESTER.—Reports from the Manchester chemical market during the past week show that here and there the recent advances in the prices of the non-ferrous metal compounds resulting from the sharp rises in the metals have affected the volume of new inquiry, but this is expected to be only temporary. In most other sections of the market, especially in the alkali products, a steady demand has been reported and new bookings have included a fair amount of business on overseas account. Quotations generally are on a firm basis. In some of the fertiliser materials current buying is on a good scale, and a steady demand exists for most of the tar products.

GLASGOW.—The volume of business which has been transacted in the Scottish chemical market during the past week has been somewhat higher than recently and there has been generally a better tone. A large demand for sodium chlorate remains unsatisfied, but generally the supply position has been fairly satisfactory with the exception of zinc sulphate, for which there is now a prolonged delivery period. In the export market there has been little change, although a number of orders for zinc oxide were received, presumably because news of the likely increase of metallic zinc had reached continental buyers.

Scottish News

Marine Oil Monopoly

BECAUSE no oil reduction plant has, so far, been established at Yarmouth, Scottish oil reduction plants erected by the Herring Industry Board in north-east and north-west Scotland for dealing with surplus fish will remain in operation during the English season.

A fleet of twelve specially chartered Norwegian freighters each carrying 1000 to 1200 crans will be operated by the board to transport any surplus fish from East Anglia to the oil reduction plants at Lerwick, Fraserburgh, Wick and Stornoway.

This transportation of surplus herring should become unnecessary when the plans for the development of oil reduction plant at Yarmouth are put into effect.

The main problems in establishing such a plant are the extensive and expensive arrangements required to handle a product which is seasonal, and not always reliable. These factors tend to increase overheads and limit the reduction of prices which could be done if the plant was working on a continuous maximum output through the whole year.

Co-operation for Exports

A promising policy being sponsored at the Hillington Industrial Estate, Glasgow, by firms there whose work is complementary in the export field, proposes that the firms should group themselves into a single body for export promotion and publicity. This experiment follows the recent suggestion by Sir Joseph Maclay that smaller Scottish firms might well consider the advantages of making a drive for export trade by co-operative enterprise. The prospect of fuller backing by the Scottish banks is under discussion.

Steel Plans "Inadequate"

"The much-advertised development plan for the steel industry produced by the present steel combines is wholly inadequate for Britain, and certainly inadequate for Scotland," declared Mr. John Heenan, Glasgow, in his presidential address to the 33rd annual conference of the Scottish Council of the Labour Party, which opened at Ayr on October 1. It was untrue, he said, to state that the industry in Scotland was in a healthy condition and able indefinitely to continue to increase production. The party's long-term policy recognised that the steel plant in Scotland was, on the whole, inefficient.

Phosphoric Insecticides

Berlin Chemist's Findings

A SECOND paper by Dr. R. Riemschneider (THE CHEMICAL AGE, July 24) in *Pharmacie*, Vol. 3, No. 11 (1948) deals with insecticides containing phosphorous. From the product known as hexaethyl-tetraphosphate and called blaban, the author could distill 30 per cent tetraethyl-pyrophosphate as a much stronger insecticide. An ester mixture is probably formed at the blaban process of the approximate formula $(C_2H_5O)6P_4O_7$, in which hexaethyl-tetraphosphate is only partly contained.

The presence of esters with higher contents of phosphoric acid or of higher contents of metaphosphoric acids can be supposed. As tetraethyl-pyrophosphate is very effective, it is advisable not to aim at a product of the summatic formula $(C_2H_5O)6P_4O_7$, but to produce $(C_2H_5O)6P_4O_3$.

The investigation of several blaban preparations has proved that a relation exists between the quantities of tetraethyl-pyrophosphate obtainable by distillation and their efficiency as insecticides. The article presents comparisons with various customary insecticides and many tables and a comprehensive list of references.

CANADIAN CHEMICALS

THE \$4 million addition to the cellophane plant of Canadian Industries, Ltd., at Shawinigan Falls, Quebec, is expected to be completed in 1951. When in operation the enlarged facilities will increase production 200 per cent over its pre-war output.

Other developments of Canadian Industries, Ltd., include: More than a million dollars on a new sulphuric acid plant and a new employee welfare building at Hamilton; a nitric acid plant is being installed at Nobel and is expected to be in operation shortly; modern material handling equipment is being installed at Windsor; while at Brownsburg the plastics plant is being enlarged and production has now begun of nylon staple fibre in the new equipment installed at Kingston.

The world population could be supplied with salt from Windsor, Ontario, for 90,000 years, according to Mr. Deniger, Quebec city sales representative of the salt division and chemicals group of Canadian Industries, Ltd. Mr. Deniger, who was addressing the annual convention of the Quebec division of the Allied Trades of the Baking Industry of Canada, stated that a solid bed of rock salt, approximately 3000 square miles in area, ranging from 200 to 400 feet thick, was available in the Windsor district.

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2 at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Process of forming laminates of plastic material impregnated fabrics and the products resulting therefrom. A. H. Stevens. (Swedlow Aeroplastics Corporation.) Aug. 22, 1945. 608,138.

Process for freeing gases from phosphine and/or arsine together with any sulphuretted hydrogen present.—Solvay & Cie. Dec. 31, 1943. 608,237.

Synthetic resinous moulding compositions.—J. Allan. Oct. 23, 1945. 607,885.

Discrete materials having water-repellant properties.—Derbyshire Stone, Ltd., and J. W. Hobday. Nov. 3, 1945. 607,968.

Polymerisable organic materials and polymers thereof.—I.C.I., Ltd., and R. Hammond. Nov. 7, 1945. 607,888.

Extraction by organic solvents of sulphur from material containing free sulphur and inorganic compounds.—W. C. Holmes & Co., and C. Cooper. Dec. 5, 1945. 608,143.

Process for manufacture of glucose by the conversion of starch in aqueous acid medium.—O. J. Meijer's Dextrinefabrieken N.V. April 17, 1942. 608,146.

Method of producing vanillin.—Ontario Paper Co., Ltd. July 9, 1945. 607,978.

Methods for the production of such glucosides of polyhydroxy compounds of the cyclopentano-polyhydro-phenanthrene ring system as have at least one free hydroxy group in the cyclopentanophenanthrene ring. Lovens Kemiske Fabrik Ved. A. Kongsted. May 29, 1941. 607,980.

Fumigation and fumigating compositions.—I.C.I., Ltd., and J. Taylor. Feb. 11, 1946. 607,982.

Obtaining valuable light-oil fractions from fuel distillates.—Koppers Co., Inc. Nov. 21, 1942. 608,266.

Production of partially hydrolysed vinyl ester polymers and interpolymers.—E. I. Du Pont de Nemours & Co. Feb. 13, 1945. 607,911.

Method for the production of 2-methylimidazolines substituted in the methyl group with an aromatic nucleus.—Lovens Kemiske Fabrik Ved. A. Kengsted. July 9, 1941. 608,067.

Manufacture of chlorine dioxide.—Mathieson Alkali Works. March 12, 1945. 608,068.

Chlorine-dioxide-producing compositions. Mathieson Alkali Works. March 16, 1945. 608,069.

Scouring of cellulose textile materials.—Mathieson Alkali Works. March 24, 1945. 607,916.

Process for the manufacture of asphaltic bitumens.—N.V. de Bataafsche Petroleum Maatschappij. Nov. 8, 1940. 608,076.

Gas separation process.—Carbide & Carbon Chemicals Corporation. March 6, 1945. 608,091.

Production of organic fluorine compounds.—I.C.I., Ltd., and W. B. Whalley. Feb. 15, 1946. 608,111.

Manufacture of diazo-dyestuffs containing copper in complex union.—Clayton Aniline Co., Ltd., J. A. Schedler, and R. Whalley. Feb. 15, 1946. 608,115.

Manufacture of reductic acid.—Koninklijke Industriële Maatschappij Voorheen Noury & Van Der Lande N.V. April 8, 1942. 608,165.

Method of preparing guanamine-aldehyde condensation products.—W. W. Triggs. Feb. 18, 1946. 608,186.

Apparatus for separating resin and other impurities from producer gas.—E. Prat. Aug. 24, 1942. 608,196.

Polymerisation of vinyl ethers.—General Aniline & Film Corporation. Feb. 21, 1945. 608,202.

Production of infusible drying oil products.—Bakelite, Ltd. Feb. 20, 1945. 608,204.

Process for the preparation of phenanthazine derivatives.—Soc. des Usines Chimiques Rhone-Poulenc. March 5, 1945. 608,208.

Extraction of protein from seeds.—Courtaulds, Ltd., R. L. Wormell, A. F. Millidge, and C. L. Knight. Feb. 19, 1946. 608,269.

Process of making secondary polyhydroxy-alkylaryl amines.—Hoffmann La-Roche, Inc. Dec. 15, 1944. 608,272.

Production of dyestuffs.—Ilford, Ltd., J. D. Kendall, and J. R. Majer. March 1, 1946. 607,918.

Detergent dispensing device.—J. G. Donaldson. March 5, 1946. 608,210.

Bituminous compositions.—R. D. Swan. March 7, 1946. 608,286.

Preparation of tertiary amino aromatic aldehydes.—E. I. Du Pont de Nemours & Co. March 9, 1945. 607,920.

Treatment of cotton fibres.—United States Rubber Co. June 22, 1945. 608,292.

Manufacture of synthetic resinous condensation products.—Beck, Koller, & Co. (England), Ltd., E. A. Bevan, and R. S. Robinson. March 27, 1946. 608,023.

Control apparatus for furnace installations and chemical plants.—H. Balfour & Co., Ltd., W. L. Burns, and J. W. Gibson. April 4, 1946. 608,294.

Manufacture of imidazolines.—Ciba, Ltd. June 6, 1945. 608,295.

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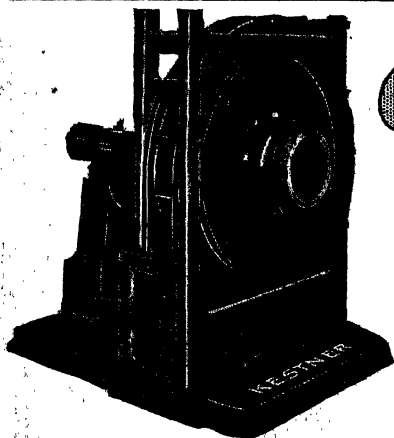
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Manufacture of imidazolines.—Ciba, Ltd. June 6, 1945. 608,296.

Manufacture of resinous condensation products.—Beck, Koller, & Co. (England), Ltd., E. A. Bevan, and R. S. Robinson. June 4, 1946. 608,027.

Apparatus for proportioning sodium metaphosphate to water.—A. H. Wallentin, H. O. Carlsson, and J. H. Vesterlund. April 9, 1942. 608,577.

Alloys for addition to steel alloys for the deactivation of nitrogen and oxygen therein.—A. H. Stevens. (E. D. Bransome.) Dec. 30, 1942. 608,486.

Preparation of colloidal aqueous dispersions of partially polymerised anionic dimethylol urea or dimethylol urea ether and methods of treating fibrous materials with said dispersions.—American Cyanamid Co. Oct. 31, 1942. 608,487.

Self-sealing submersible air ducts and armoured military vehicles comprising the same. Imperial Chemical Industries, Ltd.,

W. J. S. Naunton, and J. T. Watts. Feb. 15, 1944. 608,488.

Production of metallic magnesium by ferrosilicon reduction.—Dominion Magnesium, Ltd. Oct. 18, 1943. 608,573.

Igniters for mercury arc-discharge tubes.—G. B. Banks. March 8, 1945. 608,589.

Mercury-arc discharge devices of the kind having a mercury-pool cathode.—G. B. Banks. March 9, 1945. 608,590.

Amino-alkyl esters of diphenylamine 2-mono-carboxylic acids.—Ward, Blenkinsop & Co., Ltd., A. A. Goldberg, and H. S. Turner. May 7, 1945. 608,492.

CHEMICAL LEADWORK

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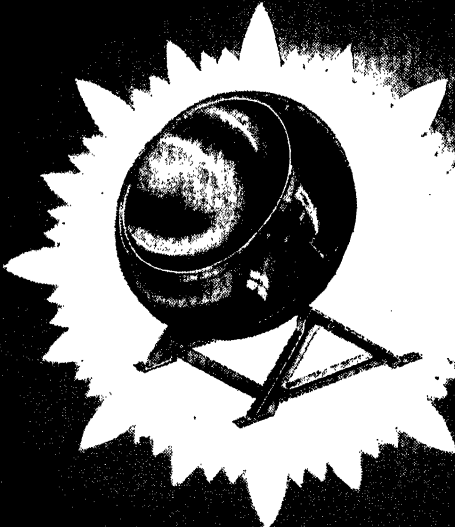
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Direction of Research

BETWEEN the viewpoints and mental processes of a Cabinet Minister and those of a research scientist stands a great gulf. Some incompatibility is not surprising. When, however, the Cabinet Minister—in this case Mr. Herbert Morrison—presents himself in the guise of champion, patron and collaborator of research scientists few can be entirely unaware of the inherent oddity of this comparatively new state of affairs. This was forcibly emphasised once more on October 22 when Mr. Morrison, exercising his functions as Lord President of the Council, assumed the attributes of herald of new research endeavour and recorder of what have lately been the rewards. This was before the meeting in London of chairmen of councils and directors of the industrial co-operative research associations.

Mr. Morrison, however limited his sympathies in many other directions, is a firm believer in research, not perhaps on precisely the grounds that a scientist might advance in its support, but because, he says, he is convinced that it pays dividends. The fact that it confers a host of other gifts of a less immediate and tangible kind is unlikely to appeal half as strongly to him; and as he is the Minister who is responsible to Parliament for the distribution of grants to research associations the need for the continued stimulation of

disinterested research by "neutral" interests need not be underlined.

That might appear an ungenerous conclusion in the light of some of the evidence of comparative munificence towards research of the practical sort with which Mr. Morrison encouraged his hearers on Friday. He said:

"While it has long been Government policy to encourage the establishment of research associations, it was only when I last met you three years ago that you first had an assurance that Government support would not be withdrawn from you after an initial stage but would be a continuing affair. On this assurance many of you have been able to develop in a big way. In 1938 the total expenditure of research associations was £470,000. Last year it was close on £2 million, and the total estimated for next year is £2½ million. That does not frighten me—so long as the cost of research more than earns its keep. Even allowing for the general rise in costs the effort has more than doubled and the number of research associations has almost doubled also, from 21 in 1938 to 38 now, with others coming along shortly."

That the kind of research in which the Government interest principally lies is handsomely "earning its keep" was acknowledged by Mr. Morrison himself, citing examples such as the continuous

On Other Pages

Leader :		<i>Production Hinges on Plant and Equipment (ABCM Dinner Report)</i> ...	550
<i>Direction of Research</i> ...	543	<i>ABCM's Annual Survey</i> ...	554
Notes and Comments :		<i>Chemistry of Radioactive Substances</i> ...	556
<i>"Ordeal by Working Party"</i> ...	545	<i>Utilising Atomic Energy</i> ...	557
<i>Defence of Steel</i> ...	545	<i>Miniature Neutron Generator</i> ...	557
<i>The Rare Reward</i> ...	545	<i>Atomic Energy Discussions</i> ...	557
<i>Divided Allegiance</i> ...	546	<i>Lead-Base Lubricating Greases</i> ...	558
<i>Helicopter Spraying</i> ...	546	<i>Vegetable Oils of Africa—II</i> ...	560
<i>D-D as Soil Fumigant</i> ...	546	<i>Scarcity of Chemical Plant</i> ...	561
<i>Another Carbon Black Plant</i> ...	547	<i>Scientific Films</i> ...	562
<i>New Carbon Black Process</i> ...	547	<i>Pyrethrum in New Zealand</i> ...	562
<i>New Fellows and Associates of the RIC</i> ...	548	<i>Austrian Mining Progress</i> ...	562
<i>Costly Ammonium Recovery</i> ...	549	<i>A Canadian Commentary</i> ...	563
<i>Versatile Plastics</i> ...	549	<i>Technical Publications</i> ...	564
<i>Research in the W. Indies</i> ...	549	<i>A Chemist's Bookshelf</i> ...	565
<i>Aluminium Prices Increased</i> ...	549	<i>German Technology</i> ...	566
		<i>Europe's Hydrogen Peroxide</i> ...	566
		<i>Italian Chemical Trading</i> ...	566

firing process in the pottery industry, which had reduced from eight to two days the time required in the kiln, the development by the British Cast Iron Research Association of high strength nodular cast iron, and some of the great economies derived from the studies by various sections of the Department of Scientific and Industrial Research. It is significant that, of the wide-ranging work performed by the DSIR, Mr. Morrison chose his examples from the spheres of lighting, housing and road research.

The quick profit motive was the subsidiary theme of much else that the Lord President found to say on the purpose and direction of future research, and, although he may be prone to regard science in general as a glorified aid to workshop efficiency, he is wholly in favour of the scientific "foremen" receiving the rate for the job.

"So far from research being an unproductive overhead," he said, "we can see the time coming when scientific research—provided we are active in using the results and that the subjects of research are rightly chosen—will be recognised as the most central and vital of all the processes of production. Research workers, therefore, must have the resources and status which they need to keep up this flow and I am

glad to know that the status and conditions of British scientific workers have been, and are being, very much improved."

Nearly all Mr. Morrison's observations helped to confirm the Government's readiness to make room for the scientist, which has been most apparent during and since the war. In that respect the Government seems to have shown more farsightedness than some sections of industry. Speaking at the dinner of the Association of British Chemical Manufacturers two days before, Sir Ian Heilbron, president of the Chemical Society, declared there were still too many individual firms which denied to the scientist any effective voice in the formulation of policy. Was it not reasonable, he asked, that the scientist, with his intimate and specialised knowledge, should be allowed to take his place on the management board on an equal footing with directors selected for qualifications apart from science? Their inclusion, he predicted, would remedy "a certain vacillating policy with which we are all too familiar."

The readiness shown by Mr. Morrison and some of his colleagues ultimately to admit scientists to "a place on the board" may also in the long run determine the success of the Government's own liaison with science.

NOTES AND COMMENTS

"Ordeal by Working Party"

THE frankness and informality with which Mr. Harold Wilson defended Board of Trade policy towards the chemical industry before several hundred well-informed critics at last week's annual dinner in London of the Association of British Chemical Manufacturers were extremely disarming. The head of the Board of Trade revealed himself as "a son of the chemical industry" and "virtually a by-product of the TNT industry," a reference to his father's activities as a chemical manufacturer in Huddersfield before and during the 1914 war. That reminiscence could be taken, as he suggested, as evidence that he is acquainted with the problems of industrial chemistry from the producer's standpoint and the good relations between the department and the association, which both generously acknowledged during the speeches, no doubt owe a good deal to his practical background. That is a gift unfortunately not generally shared by his colleagues in other Government departments with which the industry has to negotiate. Less reassuring were Mr. Wilson's pronouncements about the future of controls: of steel, he maintained with a good deal of logic that the present irksome delays—to which the ABCM chairman, Sir Harry Jephcott, among others, called his attention—might be a good deal worse under "free-for-all" conditions. Perhaps to soften the effect of this cold comfort, he held out the prospect of withdrawing "several other controls" of direct interest to chemical industry and congratulated the industry on not having been subjected "to ordeal by working party."

Defence of Steel

THE imminence of the danger of nationalisation of the steel industry was recognised, amply if rather belatedly, in many quarters this week. Mr. Eden, speaking at Warwick, referred to the ever-increasing output figures, the lack of enthusiasm for nationalisation on part of the men, and the absence for more than a generation of any industrial dispute. The national Press, too, has this week done more than any other agency to expose how irrational is the "case" propounded by

those who are determined to place steel under the domination of Whitehall. Of these exposures, the special supplement on Monday with which the *Financial Times* made intelligible to all how valuable and highly integrated is the structure which it is proposed to scrap, and the special article by J. C. Johnstone in the *Daily Telegraph* on Tuesday, "The Steel Industry Has Spiked Nationalisation's Guns," were impressive contributions. As though preparing for the inevitable, the Sheepbridge Coal & Iron Co. announced a far-reaching scheme for segregating its assets into those which would probably be taken over in the event of nationalisation and those likely to remain in private ownership. Meanwhile, the organisers of the Steel Defence Campaign from their office at 5 Queen Anne's Gate, Westminster, S.W.1, are ready to launch an intensive plan throughout the country. Mr. Alfred Edwards, M.P., on his return from America, will carry out a personal tour, addressing mass meetings, a book on the importance and efficiency of the industry is in active preparation, and a film will also be released shortly. The only obvious criticism of these latter measures is that their prospects of success would have been very much better had they not been deferred until the eleventh hour.

The Rare Reward

BEHIND the widespread publicity given to the confirmation that a high percentage of uranium exists in the new green mineral, to be known as Sengierite, which Dr. K. G. Schuiling of the French Union Minière and Dr. Anton Gray of the Kennecott Corporation, isolated recently in mines in the Belgian Congo (THE CHEMICAL AGE, October 16) lies a hint of the dramatic value which now and again relieves the comparative monotony of a scientist's routine work in the laboratory. Said Prof. Paul F. Kerr, of America's Columbia University, to whom fell the distinction of revealing the great potential value of the small green crystals found clinging to chlorite-talc rock: "When you discover a new mineral, you never know whether that's the last of it. It's like a new baby—you hope he will amount to something, but you can't tell." That enshrines the philosophic outlook, which

invites no credit for the many tests that have to be carried out (in this case the new mineral was compared with 53 other hydrous uranium minerals) and which generally lead to nothing. For once satisfaction in establishing a new identification has richly compensated for the many hours of patient study.

Divided Allegiance

ONLY the uncharitable or the short-sighted can withhold good wishes for the success of the joint committee of the National Coal Board and the National Union of Mineworkers which has been meeting daily this week in an attempt to find cures for most of the ills which have enervated the campaign to secure a much more adequate yield of coal from the mines ("Notes and Comments," October 16). The objectives are in effect to safeguard the supply of one of the fundamentals of production of nearly every industry, and particularly of chemicals, and the addition of Sir Donald Fergusson, permanent secretary of the Ministry of Fuel, as an impartial chairman helps to generate

confidence in the emergence of some tangible results. It is almost impossible, however, to be oblivious of the fact that this jury, drawn from the miners' union and what is now "the employers' side," is not manifestly an impartial one, and it is not even certain that all its members are in favour of what is in view. That impression was heavily underlined during the committee's first meetings at the latter end of last week by the grotesque circumstance that one of the key members, the NUM general secretary, Mr. Arthur Horner, was missing, having chosen instead to attend in Paris the congress of the Communist CGT to assure French miners of the support of English miners in maintaining the strike which is crippling France's economy. Whether he was justified in giving any such pledge is less important in the present connection than the fresh evidence that some of those who now exercise a decisive influence on the conduct of great industries are—to put it mildly—not entirely devoted to the cause of raising production.

Helicopter Spraying

Trials in Egypt

FIRST experiments in the use of helicopter for crop spraying are now being tried out in Egypt, near Turabi, in the Blue Nile province, on cotton land belonging to the Sudan Plantations Syndicate.

The aircraft, called a "spraycopter," is a British built Westland Sikorsky S.51, fitted with a spraying gear designed by Pest Control, Ltd., the insecticide being used is Psyltox.

Advantages of helicopter spraying are speed and ability to get close to the crops without damaging them. Another important factor is that the slip-stream of the rotor sends down a bell-shaped current of spray-laden air which coats the upper surfaces of the crops on its way down, rebounds from the ground, and thus enables the insecticide to reach the vertical and under surfaces.

British farmers have shown great interest in the idea, and Pest Control has ordered a fleet of helicopters for use in England next year. By use of these in Africa during the English slack season overhead costs can be lowered sufficiently to make air spraying only slightly more than spraying with ground equipment.

D-D as Soil Fumigant

Results of Shell Research

THE results of D-D in soil fumigation were demonstrated at a Press conference held at Shell Mex House on Wednesday, last week.

Shell D-D (dichloropropane-dichloropropylene) first aroused interest in America in 1942. Dr. Walter Crane, of the Pineapple Research Institute of Hawaii, seeking a remedy for the destruction of the pineapple crop by eelworm, obtained a derivative of petroleum—a dark liquid mixture of unsaturated chlorinated compounds—from Shell Chemical Corporation.

This mixture possessed extremely toxic properties as a fumigant and experiments were conducted against soil-borne pests. Research in this country was delayed by the war, but serious trials began here about two years ago.

Shell Chemicals are, however, now able to market D-D as an efficient soil fumigant giving full control of root-knot eelworm (*H. Marioni*). Shell research technicians are still carrying out trials, and there are many indications that D-D is effective against other soil pests and against some fungi.

New CB Process

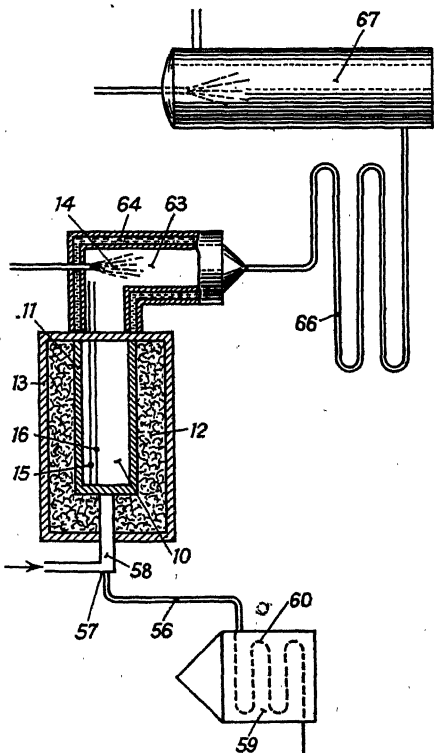
Phillips Petroleum's English Patent

THE Phillips Petroleum Co. Delaware, U.S.A., are recorded as the proprietors of English patent No. 607,296 (Application 19880/45). This relates to production of carbon black by incomplete combustion of hydrocarbons, and more particularly to a continuous method of air cooling the hot gases containing carbon black. The heat liberated from a portion of the gas is used in thermal decomposition of the remainder.

The carbon black particles formed are separated by (1) impinging on cool metallic surfaces and removed by scraping; (2) electrostatic precipitation, filtering, etc. In the latter case some preliminary cooling is required, best done by means of atmospheric cooling in the way described, instead of by direct water quench.

Several advantages are claimed for air cooling, including improved quality of product, reduced volume of gas to be processed

(Continued at foot of next column)



Another Carbon Black Plant

ECA Approves Merseyside Project

THE second large-scale project to employ American carbon black technology to establish industrial undertakings in this country and the first guaranteed U.S. investment under ERP was announced at the end of last week by the Minister in charge of the Economic-Co-operation Administration to the United Kingdom, Mr. T. K. Finletter.

The proposal, which was stated to have had the approval of H.M. Government and the ECA in Washington, has in view the establishing on Merseyside, almost immediately, of a plant to produce 8-10,000 tons of carbon black annually.

The U.S. contractor is officially stated to be Godfrey L. Cabot, Inc., of Boston, Massachusetts, which has been established in the U.S. carbon black industry for some 40 years. It will make available full technology for design, construction and operation of the plant, which will be operated by the Cabot Carbon Company, Ltd.

Half the capital will be provided by Godfrey L. Cabot, Inc., and half by British sources. It is understood that the total capital will be in the region of £4 million.

On the basis of an annual production of about 10,000 tons of carbon black, the undertaking would be capable of reducing this country's dollar expenditure by £3-4 million a year.

in carbon recovery equipment, and saving of water.

These advantages hitherto have been counterbalanced by inconvenience of progressive deposition of carbon, which has to be removed, e.g., as described in U.S. Pat. No. 2,143,770. In the present invention such deposition of carbon is avoided by limiting the temperature at which gases are admitted to the air-cooling pipe.

In the accompanying figure the oil is preheated in coil 60 of preheater furnace 59, and is introduced as vapour into reactor 10 through pipe inlet 56. The reactor has a steel shell 13, with sillimanite lining 11, and insulation 12. Air enters reactor through tangential ports 15 and 16; a small amount of air also enters through inlets 57 between pipe 56 and larger pipe 58 concentric with it. The effluent from the reactor is given a controlled quench by spray 14 in primary quencher 63 covered by water jacket 64. It then passes through air-pipe 66 and secondary quencher 67 (this latter is not an essential part), and finally into a bag filter or Cottrell precipitator.

New Fellows and Associates of the RIC

Results of the September Examinations

THE Royal Institute of Chemistry announces that the following were successful in the September examinations, 1948, for Associateship in General Chemistry or for Fellowships.

Associateships

ALLEN, Wilfred Kenneth, College of Technology, Rugby; ASHMEAD, Vincent William Joseph, Central Technical College, Birmingham; BAKER, Peter Reginald Walter, Woolwich Polytechnic; BALLINGER, Philip John, Merchant Venturers' Technical College, Bristol; BOHL, Eric James, City Technical College, Liverpool; BRIGGS, James Anthony, Technical College, Derby; CAPPER, Thomas, City Technical College, Liverpool; CLEMENTS, Henry, City Technical College, Liverpool; DAVIES, Roy Trevor, B.Sc. (Lond.), The Polytechnic, Regent Street, London; DICKINSON, Derek William, Technical College, Coventry; DIXON, Miss Jean Pickering, City Technical College, Liverpool; FIELD, Dennis Ronald, Technical College, Coventry; GOW, Robert John, Technical College, Widnes; GREEN, Maurice Speakman, B.Sc. (Lond.), Royal Technical College, Salford, and Harris Institute, Preston; GUMMER, Peter Edward, Imperial College and The Polytechnic, Regent Street, London; HODGES, Eric, Technical College, Coventry; HOLBROOK, Allan, Royal Technical College, Salford; HOLLAND, Geoffrey James, Technical College, Coventry; HULLAH, Miss Jean Irene, Technical College, Lancaster, and Harris Institute, Preston; JEFFERSON, Frank, Municipal Technical College, Hull, and Technical College, Bradford; JELLY, Lawrence Grenville, Technical College, Coventry; JOHNSON, Ronald William, Acton Technical College, London; KIRBY, Norman, Municipal Technical College, Hull; LUGGAR, Geoffrey Keith, Central Technical College, Birmingham, and Technical College, Coventry; MARTIN, Leslie Edwin, College of Technology, Manchester, Technical College, Cardiff, and Royal Technical College, Salford; MCGINN, Colin James Patrick, B.Sc. (Lond.), Northern Polytechnic and Sir John Cass Technical Institute, London; MCLELLAN, James Kidd, M.A., B.Sc. (Glasgow), University and Royal Technical College, Glasgow; MITCHELL, Thomas Allen, City Technical College, Liverpool; MOCKRIDGE, John, Royal Technical College, Salford, and Chelsea Polytechnic, London; MORRELL, Norman, College of Technology, Leeds; MULLIN, John,

Technical College, Paisley; PARKER, Harry Lionel, Technical College, Derby; PEARCY, Victor Joseph, Municipal College, Portsmouth; PRIESTLEY, Edgar, Technical College, Huddersfield; REES, Philip Owen, Technical College, Cardiff; ROGERS, Miss Elsie, Technical College, Coventry; SEPH-TON, Douglas Peter, Medway Technical College, Gillingham; SHELTON, James Harry, South-West Essex Technical College, Walthamstow; SIMPSON, William, Royal Technical College, Glasgow; SMITH, John William, Battersea Polytechnic, London; THOMAS, Howard, B.Sc. (Lond.), Technical College, Bradford; THORP, Alan, College of Technology, Manchester, and Royal Technical College, Salford; TUNSTALL, Geoffrey, City Technical College, Liverpool; TURN-BULL, William Briggs, Constantine Technical College, Middlesbrough, and Technical College, Sunderland; VINES, Gordon David, University College, Leicester; WHITE, Peter Thomas, University College, Leicester; WILKIE, Alan George, Technical College, Bradford; WILSON, Hugh Arthur Baird, B.Sc. (Lond.), Royal Technical College, Glasgow, and Technical College, Paisley; WILSON, Raymond Ernest, B.Sc. (Lond.), Harris Institute, Preston; WOOD, Charles William, B.Sc. (Lond.), College of Technology, Leeds; WOOLER, Alan Metcalf, College of Technology, Manchester, and Royal Technical College, Salford; WORRALL, Edgar John, City Technical College, Liverpool.

Fellowships

Branch C, Organic Chemistry: CASSON, Frank David, B.Sc. (Lond.); GREENHALGH, Norman, B.Sc. (Lond.); PARKER, Donald, B.Sc. (Lond.).

Branch C, Organic Chemistry, with special reference to high polymers: JOHNSON, Alfred Sydney, B.Sc. (Lond.); RAY, Stanley, Arthur, B.Sc. (Lond.).

Branch C, Organic Chemistry, with special reference to oils, fats and waxes: SAUNDERS, Aubrey, B.Sc. (Lond.).

Branch E, The Chemistry, including microscopy, of food and drugs and of water: KULANAYAGAM, Vallipuram; SUFRIN, Reuben, B.S. (Lond.); THACKRAY, Gerald Bowling, B.Sc. (Lond.); WATSON, Robert Sinclair.

Branch H, General Analytical Chemistry: GLOVER, Jack Harry, B.Sc. (Lond.); HAMLIN, Anthony George, B.Sc. (Lond.).

Special Examination in Pharmaceutical Analysis: GILLHAM, Ronald William.

Costly Ammonia Recovery

Six-fold Increase in Glasgow Tender

THE phenomenal rise in costs of materials and constructional work was referred to when the Glasgow Corporation Gas Committee considered the plans for the extension of the sulphate of ammonia plant at Provan chemical works. The scheme before the war was originally estimated at a cost of £1800 and it was anticipated that the current price might be in the region of £5000, but when tenders were submitted the price proved to be £10,600.

This sum was considered excessive by the committee and the matter was referred to the Ministry of Fuel and Power, which ruled that, as tenders had been invited, the lowest offer must be accepted.

It was pointed out that this "enormous" expenditure would be added to £21,000 spent on an ammonia plant, which it was alleged had never worked, and it was even doubted by one member if this additional outlay would make the plant operative.

The purifier plant, it was explained, was for the existing system not for the new Provan chemical works plant. It was claimed that disposal of sulphate of ammonia from municipal gas plants had never paid, but the work had to be carried on as an adjunct to gas manufacture.

The expenditure was finally approved by a majority vote.

VERSATILE PLASTICS

SYNTHETIC boards, plastic laminates, and resin-bonded materials form the basis of the exhibits now on view at Murray House Exhibition Hall, London, S.W.1. Organised by the Council of Industrial Design the idea is to show what can be done with these materials.

Office and domestic furniture made from plastic board are to be seen, also a miner's helmet showing the use of laminated paper made from cotton rags. Of considerable interest is the test model of a Handley-Page Hermes V, made from Fibrenyle, an alternative to steel, which is produced in the form of a dough consisting of vegetable or mineral fibres mixed with plastic resins.

ECA Purchases Approved.—Purchases by Britain to the value of \$44½ million were approved by the U.S. Economic Co-operation Administration on October 14. These included petroleum products from Arabia and Saudi Arabia, carbon black from the U.S. and lumber and saw-mill products from the U.S. and Canada.

Research in the W. Indies

Industrial and Agricultural Projects

EXPENDITURE totalling over £580,000, under the Colonial Development and Welfare Acts was approved for research schemes in the West Indies in the year ending March 31, 1948. The largest grant was one of £165,000 for a ten year programme of soil research.

Important developments towards establishing industries based on sugar, have been made in the manufacture from sugar of substitutes for blood plasma and glucose. These discoveries have resulted from work being carried out in the United Kingdom, in which the Colonial Products Research Council is interested. A research unit in sugar technology is to be set up at the Imperial College of Tropical Agriculture, where carbohydrate derivatives from sugar have been prepared with analgesic, local anaesthetic and toxic properties, and one has been selected for clinical trial of its analgesic value.

Microbiology

The official opening of the Colonial Microbiological Research Institute has made Trinidad a Commonwealth centre for microbiological research.

In agriculture, the Imperial College of Tropical Agriculture has had affiliated to it three schemes which will benefit the West Indies as a whole; these are a soils research scheme, a banana research scheme, and a cocoa research programme.

The desirability of investigating the mineral resources of the West Indies, as well as volcanic phenomena, water supplies, etc., was considered when Dr. F. Dixey, director of geological surveys visited Jamaica, British Honduras, Trinidad, British Guiana and St. Lucia.

(Commonwealth Survey, No. 8, October 2, 1948).

Aluminium Prices Increased

The British Aluminium Co., Ltd., has announced that, in view of the increased prices for virgin aluminium announced by the Ministry of Supply (THE CHEMICAL AGE, October 16), its prices for raw and fabricated aluminium products have had to be adjusted. The new raw material prices reflect the increases in the price of aluminium and other metals used for alloying. The new prices for fabricated products have also taken partially into account the effect of recent wage awards, the overall result being, in general, an increase of 1d. per lb. The new prices apply to all orders accepted on or after October 11 and later will refer to all deliveries.



Mr. Harold Wilson (President of the Board of Trade) with Sir Frederick Bain (right), vice-chairman of the Association of British Chemical Manufacturers, at the reception preceding the association's annual dinner in London last week

ALL departments of chemical industry were more fully represented than they have been on any post-war occasion when the Association of British Chemical Manufacturers held its annual dinner on October 13 at Grosvenor House, London, W.1. The occasion was distinguished by the presence among the long list of guests, to whom the association chairman, Sir Harry Jephcott, acted as host, of the President of the Board of Trade, Mr. Harold Wilson, an prominent figures in the academic, research and administrative spheres. The speeches accordingly presented a very representative symposium of recent development of industrial chemistry, the universities, research and the relationship between industry and the Government.

Sir Harry Jephcott, proposing the toast of "The Guests," observed that the principal guest, the President of the Board of Trade, had told him of his desire to know more about the chemical industry. In his following remarks the speaker gave an able review of the scope of the present-day industry and of some of its more urgent problems.

The chemical industry was not easy to define, he said, and there were in existence several different definitions, as became ap-

PRODUCTION HINGES ON PLANT AND EQUIPMENT

The ABCM States its Case

parent if one consulted official regulations.

One could approach this problem of definition from the standpoint of the textbooks and say that if, as a result of an industrial process, chemical change as distinct from merely physical alteration has taken place, then that process falls within the chemical industry. Such a definition would be very wide. It would extend from the manufacture of rayon to the carbonisation of coal and might even be held to include the human digestive processes.

The primary products of the chemical industry left no doubt as to their character—the heavy chemicals, the tar products, the dyestuffs, the fine chemicals. These constituted the hardcore of the industry but, in addition, there were very closely allied manufactures of a less strictly chemical type, but which were commonly included within this industrial group, such as pest control products and pharmaceuticals.

Closely Integrated

At first sight there might be little connection between the manufacture of, say, sulphuric acid and a dyestuff or a pharmaceutical; yet, in practice, they were all interwoven, the products or by-products of one being the essential raw ingredients of another. There was great complexity within the industry and a high degree of interlocking and interdependence.

During the last war the industry had met all the demands which were put upon it. Now the chemical industry had very properly been called upon to pay its full share in the effort which the country is making to regain economic freedom.

It could fairly be claimed that the industry has not failed in its task. The total export of chemicals now stood at 155 per cent by volume as compared with 1938. This was no mean accomplishment when it was remembered that direct exports were not to be the first, but the last claim upon the industry.

Of the total chemical products sold at home, or exported, and estimated in 1947 to have a value of £233 million, almost 90 per cent was produced in this country or, excluding those chemicals which represent unavoidable imports, such as potassium

salts, no less than 93 per cent was manufactured within this country.

These great increases in productivity had not, however, resulted in any feeling of complacency. They were conscious of the competition from their colleagues across the Atlantic, but they suffered two handicaps—the first an inadequate supply of trained and practical men with a sound knowledge of chemistry and of chemical engineering, conscious of the urgency for developing pure research into industrial process.

An even greater difficulty related to physical facilities. Broadly, within the chemical industry productivity depended upon plant capacity. To overcharge plant was commonly to court disaster—to reduce output and efficiency, not to increase them. Increase in production rested upon the availability of plant and, by plant, was meant not merely the particular vessel, the still, the filter press, the centrifuge. It was no good providing plant, unless there were buildings to go with it. It was unfortunate that, for Government purposes, buildings were the responsibility of another Ministry. Those circumstances resulted in frequent and most serious delays.

Annoying Delays

Recently there had been the instance of a firm wishing to put up a pilot plant to try out a new process with tremendous potentialities. In spite of this, they had to wait 18 months for the few tons of steel required. That was only the beginning.

He could speak from personal experience of other kinds of delays. His company had required to use some rather large pipes which needed bending. The people who did that kind of work had notified them that nothing could be done in less than six months. The chemical industry was entitled to say: "Give us the plant and we will give you the output."

The speaker went on to acknowledge warmly the helpful reception which had

always been extended to the association and to its members of their industry by the Civil Service, which, in countries overseas, was regarded with an admiration amounting almost to veneration. He himself had had from the Government departments nothing but fair deals and no favours.

Alert Ostrich

The scientific societies, of which many eminent members were also among their guests, were prone to regard the chemical industry as an ostrich, with its head in the sand, exposing part of its anatomy which had a fatal fascination for the academic boot. They did not mind the very gentlemanly kicks they administer; indeed, a few kicks might be good for them, but they did emphatically insist that, however ostrich-like the industry may appear, its head was not in the sand. Its head might be near the ground, but it was searching for those inconsiderable metallic trifles which had escaped the control nets of Government officials.

Whatever differences of opinion might exist between them as individuals, there was one matter upon which they were completely united. They would all do everything in their power to hasten the day when this country had gained its complete economic freedom and could stand among the nations, dependent upon none and co-operating with every nation of goodwill, for the betterment of all.

A Key Industry

Mr. Harold Wilson, President of the Board of Trade, responded for the guests, who, he said, were glad to render honour to the chemical industry, upon which nearly every industry in the country depended in some degree. His first meeting, within 24 hours of his appointment to the Board of Trade, had been with the chemical industry and with their association. His acquaintance with the problems of the industry,

At the chairman's table (from the left) Mr. R. Duncalfe, Mr. Harold Wilson, Sir Harry Jephcott and Sir Robert Robinson



particularly such matters as key industry duty, extended to a period very much earlier than his appointment at the Board of Trade. His father had been in the industry for close on 50 years.

The chemical industry, towards which, he was aware, the BoT bore a most important responsibility, was one of the industries playing a very important part in national recovery. A first charge on the industry had been to keep going essential supplies for home industries, but it had also made a great direct contribution to the export drive. Chemical exports had risen in value from £22.25 million in 1938, to an annual rate of £80 million in the first half of this year. In terms of volume, exports in the first half of 1948 were 52 per cent above the figure for 1938, and for July and August about 67 per cent above the 1938 figure. The value of chemicals exported in July-August was £7.3 million, which was approaching the end-1948 target of a little over £8 million a month.

Achieving Independence

They had to think also of the very great contribution the chemical industry was making to import saving, particularly in agriculture, through fertilisers and plant protection products.

There were in being many important projects which would eliminate large amounts of organic chemicals and plastic materials which have been imported from North America, including molasses, alcohols, solvents, and a wide range of oil derivatives, together with materials for the rapidly growing plastics industry. Expenditure has been in the region of \$60-70 million a year, and this would in future be greatly reduced and, in the case of many products, eliminated.

In a period of necessarily severe restrictions of capital building, important dollar-saving chemical schemes had still gone on. The pace must, however, be dictated by the rate at which provision of plant and buildings could be made. The main difficulty was that the country's plant producing capacity was inadequate for demand on the present scale, and the chemical industry itself was never laid out on a scale to meet all the needs of this country in a period of post-war reconstruction.

At one time, he declared, it would have been possible to find engraved on his heart the words "soda ash." Now, soda ash was no longer a very scarce commodity, but it would take some years before the country's caustic soda production was adequate to meet all the demands being put upon it.

The chairman had spoken of the delays in getting licences for construction and the

delays which occurred thereafter. That, he considered, demonstrated how valuable a licensing system was; without such a system the gap would be infinitely longer.

Necessarily, there had latterly been severe restriction of building, but the chemical industry had had a share greater than that of almost any other industry. New materials, ardil, terylene, polythene, synthetic detergents, had been developed, and rapid progress was being made in regaining the leeway lost during the war and in keeping pace with modern developments in the plastics industry.

Building plans in the industry amounted to well over £200 million by 1952—for expansion of production of alkalis, synthetic fibres, fertilisers, plastics, dyestuffs, carbon black, and a wide range of miscellaneous inorganic chemicals. Production of dyestuffs was already over 50 per cent above pre-war; plastics output was well over three times that of pre-war, and was to be increased still further in the next four years.

Some of these new plants were already nearing completion: when all were working the net result would be that, with a few exceptions, we should be self-supporting in the main items of chemical production, and in goods such as alkalis, dyestuffs, and phosphatic products we should have a substantially increased margin for export. There were also several major projects afoot, linked with the planned expansion of United Kingdom refinery capacity, for cracking oil for chemicals.

Aid to Europe

These developments, taken together, would represent a notable contribution to the solution of our own balance of payments difficulties within the next four years, and would enable us to reduce the dependence of other European countries on dollar imports. The chemicals development plan therefore formed an important item, along with the other major industrial development plans, in the four-year programme which H.M. Government had submitted to the Organisation for European Economic Recovery.

He cordially acknowledged the great help and co-operation all Government departments had received from the ABCM during and since the war, particularly in connection with the relaxing of controls. They were looking forward now to the prospect of removing several other controls.

Among other Government affairs of importance to the industry, the Monopolies Act contained one or two sections which, in his view, would be found to have applications to their industry. That would have to be further considered as the Act went forward. The industry had not been subjected to

"ordeal by working party" and he thought that, appropriate as it was to many other industries, it would not be possible to set up for the chemical industry a working party representative of both sides which would be competent to deal with all the complexities and ramifications of the industry.

The Government was particularly anxious to enlist their support in ensuring the future technical development of the industry, and as soon as its own tripartite plans were set up, it was hoped to go more closely into the subject with them.

The Scientists' View

The toast of "The Association" was proposed by Sir Ian Heilbron, president of the Chemical Society. He surveyed the extremely wide field in which the association had served the industry and the national interests and, as an academic scientist, he acknowledged the generosity of the association in placing a fund at the disposal of the Chemical Council for the publication of research memoirs. Without that the work could not have been carried on.

He questioned, however, whether all that was possible had been done to reach the goal the association had set itself. Ways might still be sought to ensure closer contact between individual firms and for pooling information of the sort which often was, in fact, an open secret. He had observed a welcome change of policy in many firms regarding the publication of scientific papers, but he still thought that this trend could go further, with advantage to the individual firm and to the community—the secrecy obsession dies hard.

"Relentless Control"

The President of the Board of Trade had told them how much higher production was than in 1938. The speaker was convinced, however, that higher goals would be reached. It was of first importance to apply what is already known, and it was here that the Government could do much to reduce the difficulties and frustrations which beset the chemical manufacturer. If we were to secure the advantages of time and opportunity which now present themselves, the Government should relax immediately its relentless control of all facilities for new development. The translation of an invention from the laboratory-bench to the small-scale development plant was an obvious prerequisite of production, but one which Government departments appeared to have considerable difficulty in appreciating.

Sir Henry Tizard's recent statement to the British Association should not be interpreted as meaning that we could allow research to

take a second place. In chemistry there was no more dangerous attitude of mind.

The Universities were playing a worthy part in providing men of the calibre needed; he rejected entirely the contention that their syllabuses were too narrow. He was more disposed to question whether the industry always used these men to the best advantage. There were still too many individual firms which denied to the scientist any effective voice in the formulation of policy. Was it not reasonable that the scientist, with his intimate and specialised knowledge, should be allowed to take his place on the management board on an equal footing with directors selected for qualifications apart from science? Surely this could only result in providing a remedy to those vacillations of policy with which we are all too familiar.

A Proud Duty

Sir Frederick Bain, vice-chairman of the ABCM, to whose distinguished record in industry and industrial organisation Sir Ian Heilbron had referred, replied to the toast. He spoke appreciatively of the terms in which they had been addressed by the President of the Board of Trade and declared that if future approaches to the industry were made in the spirit in which Mr. Wilson had spoken they would be met by the same spirit.

They were conscious that the responsibility now resting upon chemical industry was greater than ever before. If they tackled present problems with vision and courage they would achieve something of which they could all be proud—by getting their country through her economic troubles by 1952.

Referring to less immediate problems, the speaker called attention to the effect of widened chemical knowledge and applied science in disturbing many factors which had traditionally affected the human race—in keeping so many people alive. Science had the great responsibility of determining how to make an adequate contribution to feeding all these rapidly increasing populations.

Chemical industry had been likened to an ostrich. The resemblance was, he thought, to quite a different bird—the stork.

[THE CHEMICAL AGE owes its apologies to the President of the Board of Trade for having accredited Sir Stafford Cripps to his office (THE CHEMICAL AGE, October 16). This was entirely unpremeditated—and without malice.]

U.S. Loan to Chilean Industry.—A cellulose factory to be constructed in Chile at a cost of U.S.\$7.5 million will be financed by a loan repayable over 20 years.

ABCM's ANNUAL SURVEY

Industry's Export Target Almost Reached

AT the annual general meeting of the Association of British Chemical Manufacturers, held in London on October 14, the chairman, Sir Harry Jephcott, moving the adoption of the annual report and accounts, said the past year had been one of great activity due to the unprecedented economic difficulties with which the country had been faced.

The Eastern branch office, he said, was now firmly established and was doing good work. India and Pakistan were passing through a period of great political, administrative and economic stress and the full benefit of the Eastern branch office could only accrue in the longer term. He believed, however, that those who were supporting it were well satisfied with its work and would not fail to continue their support.

The Export Drive

During the past year, special urgency had been given by the Government to the export drive. The chemical industry might justly be proud of what it had achieved. Not only had it met most of the increased demands of the home consuming industries, especially of those which have themselves to provide much greater exports, but it had also augmented the country's direct exports of chemical products.

"We are well on the way to reaching the target set for the end of 1948 of £8.05 million per month," he said. "To some extent we have been handicapped by shortages of materials and to a small extent of labour, but our main difficulty has been the problem of obtaining authority for the new buildings and plant which are essential if production is to be further increased and the consuming industries assured of the chemical raw materials they require."

There was, however, continued the chairman, a ray of hope for the country's chemical industry in the future. Its vital importance as a supplier of essential raw materials to all other industries was at last being recognised by those in authority, and building licences were at last being granted over a wider field. But chemical factories could not be erected overnight and it would be many months, if not years, before they could meet the demands which might be made upon them, both for home and export.

The position as regards supplies of plant was a little easier. Urgent bottleneck cases had been successfully handled by a small informal panel, on which they gratefully acknowledged the willing help of the Board of Trade, the Ministry of Supply, and the

British Chemical Plant Manufacturers' Association.

The position in respect of Germany had changed considerably in the past year, mainly because of the difficulties which had arisen with Britain's Eastern ally, the chairman observed. It had become more necessary than ever to re-establish a sound economy in the Western zones. That was likely to mean fewer reparations, but those were a doubtful asset in any case.

The mission which the Government finally allowed to visit Germany in connection with dyestuffs and pharmaceuticals had given them a clearer picture of future possibilities, while the new contacts established with the German Chemical Manufacturers' Association in the British zone afforded a direct channel for the discussion of the various problems that were bound to arise between their two industries in the next few years.

"We have many difficult problems ahead of us," he added. "We must build up and develop our industry so that in scope and efficiency it is second to none. There are still large imports of chemicals which we ought to be able to make here and to this we shall have to give special attention. Research work continues on a satisfactory scale, but development is unduly restricted by the limitations on capital expenditure imposed on us by Government policy. Given freedom from irksome restrictions, we are convinced of our ability to develop a still more flourishing and efficient chemical industry in this country."

Staff Loyalty

In conclusion, Sir Harry Jephcott thanked all members of the association, and in particular his colleagues on the council, for their loyal support throughout the year, and the past chairman, Mr. L. P. O'Brien, who had deputised during the chairman's absences abroad. He also recorded his appreciation of the loyalty and zeal of all members of the staff.

Among the items of interest in the annual report, it is pointed out that early in the year under review, the association's Group B, expecting an early inquiry into the future of the Key Industry Duties, arranged for the preparation of a booklet, "Fine Chemicals and the Nation's Future," designed to inform Members of Parliament, and those whose opinions might be of influence, on the nature and importance of the industry. The provision in the Spring Budget for the extension of the Key Industry Duties for a

further three years removed the immediate need for the booklet. Arrangements had been made for the text to be reviewed periodically ready for expeditious publication when the occasion arose.

The council also reported matters as follows:—

The 1948 Finance Act, while extending the life of the Key Industry Duties, throws the duties open to modification as the result of trade agreement negotiations with other countries. A satisfactory assurance was given by the Board of Trade that, as hitherto (notably in connection with the Geneva negotiations), the association would be consulted when any such modification was proposed.

The group's statistical scheme continues in its simplified post-war form for the collection of quantitative data on the production of each fine chemical made by members.

Arrangements were made for an intensive study, in consultation with members, of the imports of K.I.D. chemicals during 1947, with a view to ensuring that the industry would itself produce as many as possible of the fine chemicals which are at present being imported.

In parallel with the survey of the 1947 imports of K.I.D. chemicals, the council decided that a similar investigation should be made into the possibilities of reducing the volume of imports of general chemicals. This is now in hand.

German Chemicals

The revised plan for the level of post-war German industry in the Anglo-American zone of Germany was published on August 30, 1947. The chemical production was to be allowed to attain practically the 1936 level, although this was not expected until 1950 or later. As total exports were to be increased to 15 per cent above 1936, in order to pay for imports, it was obvious that chemicals would have to form a considerable proportion of the total. One of the main objects of these decisions was to settle finally the plants to be declared surplus for reparation purposes. Unfortunately, the failure to reach agreement on reparations by the four Powers in Berlin has delayed allocations to the western countries and many plants which have actually been dismantled in the British zone are simple rusting away on the site owing to the refusal of the British Government to proceed with allocations except by a four-power agreement.

In spite of the time devoted to this matter by the association staff during the last two years and help given to the Government by members in providing technical representatives to inspect German plant, the paucity of progress has confirmed the view ex-

pressed last year that the benefit to British chemical industry from reparations will be negligible.

A list of 38 gases and vapours, for which tests suitable for use under works conditions are considered necessary, has been drawn up and submitted to the Chief Inspector of Factories with the request that the work should be undertaken by the Government on behalf of the Government departments concerned and industry as a whole. Full technical co-operation will be given by members. Nine more products have been listed where further physiological information is needed to decide the nature of the test required and a further eight will be watched for possible future developments in industrial use.

Membership and Officers

On May 31, the conclusion of the year, there were 206 members of the association. Six new members joined during the year: one, a subsidiary company no longer making chemicals, resigned.

The constitution of the council over the ensuing year was stated to be as follows:—

President: Dr. P. C. C. Isherwood, O.B.E.

Vice-Presidents: Dr. F. H. Carr, C.B.E.; Mr. R. Duncalf; Dr. E. V. Evans, O.B.E.; Mr. C. A. Hill; Mr. C. F. Merriam; Mr. L. P. O'Brien; Mr. R. G. Perry, C.B.E.; Mr. C. V. Merriam will also act as an additional vice-chairman.

Elected Members: Chairman, Sir Harry Jephcott; Vice-Chairman, Sir Frederick Bain, M.C.; Honorary Treasurer, Mr. C. E. Carey; Mr. A. D. Daysh; Dr. A. E. Everest; Mr. C. G. Hayman; Mr. G. E. Howard; Mr. W. F. Lutyens; Mr. L. G. Matthews; Mr. T. D. Morson; Mr. D. P. C. Neave; Mr. F. G. Pentecost; Mr. S. W. Whiffen; Mr. G. F. Williams; Mr. K. H. Wilson; Mr. H. Yeoman.

Co-opted Members: Mr. B. A. Bull; Mr. I. V. L. Fergusson; Mr. W. K. Hutchison; Mr. Derek Spence.

Honorary Vice-Presidents: Mr. N. N. Holden; Lord McGowan.

Director and Secretary: Mr. J. Davidson Pratt, C.B.E.

Joint Managers: Mr. R. M. Drake; Mr. A. J. Holden, B.Sc.

New Hungarian Association

Hungarian scientific and technical societies have recently formed the Association of Hungarian Societies for Technics and Natural Sciences. It aims at the unification and rationalisation of research work, the organisation of documentation, the establishment of a central publishing house for professional periodicals, etc. The new association intends to maintain contact with foreign scientific associations and plans to acquaint Hungarian scientists with the results of research work abroad. Results of Hungarian scientific research are to be made known to foreign scientists at the same time. The new association's address is Szalay-utca 4, Budapest, Hungary.

Chemistry of Radioactive Substances

The New Factor in Science and Industry

(From a Special Correspondent)

RECOGNISING how rapidly and widely the development of radioactivity are likely to affect industrial and scientific processes, the Oil and Colour Chemists' Association have sponsored the series of three lectures now being given by Prof. H. J. Emeléus summarising the fundamentals of the subject, the first of which was delivered in London recently.

The Beginnings

Prof. Emeléus opened with a general historical survey. Röntgen's observations in 1896 of the fluorescence of a barium platinocyanide screen when exposed to X-rays, started the particular train of work which led to the atomic bomb and the atomic pile, said Prof. Emeléus.

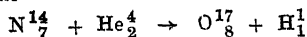
Becquerel carried these studies further by irradiating a uranium salt, wrapping in black paper and obtaining an image (through a perforated mask) on a photographic plate. But he found that he obtained the same result on a blank determination with the uranium salt. Thus, the radiations penetrating the black paper originated in the uranium itself.

Rutherford showed the radiation to consist of two parts; α rays of low penetration and high ionisation, β rays of great penetration and low ionisation. Then came the search for radioactive elements. Pitchblende was found by the Curies to have an activity greater than corresponded with its uranium content—the radiation being measured by the rate of discharge of an electroscope.

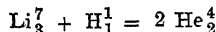
From the pitchblende group of minerals were isolated radium and polonium—both very active, actinium, radon and several others. Some appeared to have a constant rate of radiation, as, for example, uranium, but some appeared to decay quickly, for instance, radon. In 1903, Rutherford and Soddy had the idea of the decay series. The law $I = I_0 e^{-\lambda t}$ was discovered (I being intensity at time t , I_0 initial intensity, λ a constant); the nature of the different radiations α , β , γ was cleared up. It was realised that a loss of a β particle was equivalent to the gain of a positive charge and soon the various decay series were known.

Thus, the radium series consists of $U_1 \rightarrow Ra \text{ G}$ (which is Pb^{208}), the thorium series ends in Pb^{208} and the actinium series goes to Pb^{207} . It was confirmed that these were all chemically identical, differing only in atomic weight. They were duly named isotopes.

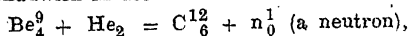
In 1919, Rutherford achieved the artificial disintegration of nuclei by α -particle bombardment



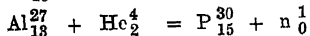
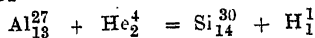
This was found to be possible for a range of light elements, excluding carbon and oxygen. The α particles, small, having high energy, occasionally hit a nucleus, producing disintegration. Now the physicists began bombardment with artificially accelerated particles, for instance, protons accelerated in a cyclotron. Thus Cockcroft and Walton in 1932 performed the reactions



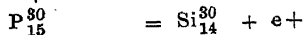
Chadwick in 1932



Discovery of artificially induced radioactivity by Curie and Joliot followed soon, in 1934



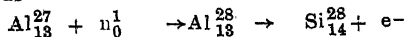
followed by



Thus, if the aluminium after bombardment is dissolved in acid the gas evolved is radioactive, due to the active phosphorus in the phosphine.

Neutron Bombardment

Neutrons penetrate readily and are readily captured, since there is no charge and therefore no repulsion to overcome. Fermi found slow neutrons to be more readily captured than fast. An early discovered reaction was

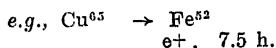


By analogy to this Fermi tried to produce a heavier element from U but found in the product a number of activities due to fission to isotopes of Lanthanum, barium, krypton, etc. The total range of atomic masses was 72 to 162. Two massive fragments were found, several neutrons were emitted, matter was destroyed and appeared as energy. The nucleus derives an increase in energy on capturing the neutron and becomes unstable.

In the fission products are also masurium (element 43), element 61 in appreciable quantity and halogens (including element 85). They are all radioactive, usually β , and have series of changes down to a stable

and product. Thus, Sb_{51}^{133} goes via intermediate steps ultimately to Cs_{55}^{133} . 60 of these chains are known. The fragments initially have a mass greater than corresponds to the nuclear charge. By the loss of the β particles the latter is increased.

Unusual results have been obtained in California by a bombardment by deuterons with energies up to 2×10^6 . This has produced e^+ emitters



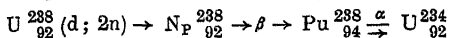
This type of break-up has been named spallation.

Transuranic Elements

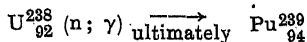
Names, symbols and atomic numbers of the transuranic elements are as follows:—

Neptunium	NP	93
Plutonium	Pu	94
Americium	Am	95
Curium	Cm	96

First samples of plutonium were made in the cyclotron. (In the notation in brackets used below, the first symbol represents the bombarding particle, the second the emitted; d signifies deuteron, n neutron).



In the pile



The new elements have provided a new radioactive decay series, the $4n + 1$ series, which fills a gap in the known series $4n$, $4n + 2$ and $4n + 3$. None of the members of this new series occurs in nature. The end product is Bi^{209} .

Electronic structure of the transuranic elements is analogous to that of the rare earth series. The "build-up" from one element to the next is by an increase in the number of electrons in the 5f shell, which is an inner shell, not in the outermost. Hence, in their chemical properties they are very similar to each other.

Most of them show a number of valencies. For instance, plutonium has valencies of 3, 4, (5), 6. Plutonium also forms the ion PuO_2^{++} isomorphous with UO_2^{++} . The iodate $\text{Pu}(\text{IO}_3)_4$ is insoluble and is used in quantitative determinations of the element.

Despite all the present-day difficulties, concluded the lecturer, the discovery of atomic fission has been an outstanding achievement making available new sources of power and new special isotopes.

Utilising Atomic Energy

Fresh Estimates

THE progress in harnessing the power from atomic energy was the topic of recent speeches in America and England.

In Baltimore, Mr. David Poole, who is associated with the project for using nuclear energy for the propulsion of aircraft at the U.S. Government's plant, Oakridge, Tennessee, stated that the theory of atom-driven aircraft had been "99 per cent perfected." A way had been found by the scientists to tap power from a mobile atomic pile; now, he said, it was up to the engineers to design and build the engine and plane controls and protection for the crews.

In Cambridge, Mr. Brendan Bracken, M.P., addressing the University Conservative Association, foresaw the employment of atomic energy in industry, not in centuries, but within decades. If we are willing to take big risks in research, he said, the effect of atomic energy in industry could in 20 years bring renewed prosperity.

MINIATURE NEUTRON GENERATOR

FIRST-Hand knowledge of nuclear energy is now available for students by means of miniature equipment, safe and cheap enough for use in college laboratories, which has been developed in the United States.

The new apparatus, a neutron generator, employs a speck of radium, less than 1/500 oz., so that the dangers inherent in radioactivity research are virtually eliminated.

Experiments performed by students, according to Robert H. Schuler and Dr. William H. Hamill, of the University of Notre Dame, have used a small amount of a mixture of the elements radium and beryllium permitted experiments resulting in the production of radioactive isotopes.

Particularly good results are said to have been obtained in irradiating normal iodine and bromine with neutrons from the generator. Three radioactive isotopes, iodine-128, bromine-80, and bromine-82 are produced. The rapid rate of decay of these highly unstable isotopes can be observed with a Geiger counter.

Atomic Energy Discussions.—Britain, Canada, and the United States held secret talks last week at Chalk River, Ontario, on the question of atomic energy. An official stated that the discussions covered continuation of atomic co-operation between the three countries. Sir John Cockcroft, director of the British research station at Harwell, was among the delegates.

LEAD-BASE LUBRICATING GREASES

Recent Departures from Conventional Processes

A. E. WILLIAMS, F.C.S.

FOR many years a big proportion of lubricating greases have consisted largely of calcium, sodium or aluminium soaps, incorporated with a suitable mineral oil. More recently, however, there has been an increasing tendency to use other soaps with a view to obtaining modified properties in the greases. Such soaps may be based on lead, and to a lesser extent on magnesium, barium, etc.

A further development in the grease-making industry followed as a natural outcome of the enhanced cost of glyceridic oils and fats. As a consequence, the by-products of the oil refineries, "acid oils," consisting mainly of fatty acids and neutral oil in admixture, are being increasingly used in soap production for greases.

While the practice of using acid oils in grease making has the advantage of facilitating saponification, due to the high proportion of free fatty acids in such oils, some of these oils contain much colour, so that they cannot normally be used for light-coloured greases.

Lead Soaps

A grease based on a lead soap, such as lead oleate, may produce a high degree of friction reduction, combined with good stability in the lubricating film; the lead soap also imparts a fluidity to the grease which is unobtainable from the older types of grease soap.

In the production of lead soaps, the raw material may be fatty acids, a vegetable or animal oil, or acid oils from the refining of these. It is possible to produce a fairly pure lead soap, lead oleate for example, by reacting litharge (PbO) with oleic acid; but when the litharge acts on a glyceridic oil, or acid oils, a mixture of soaps results.

The solubility of such a soap mixture varies with the type of oil or fat used. In general, the chief unsaturated acids in oils and fats will produce lead soaps that are soluble in the mineral oils with which the soaps are compounded in grease making.

The more highly saturated fatty acids, on the other hand, tend to produce lead soaps that are only partially soluble.

To obtain lead soaps having good solubility in mineral oil, the grease makers choose a highly unsaturated oil, such as unhardened whale oil, or its acid oil. For lighter-coloured greases, peanut oil, or its acid oil, may be used.

Lubricating greases in general cannot be regarded as simple solutions of soap in mineral oil, but there is a relation between the solubility of a specific soap and the amount of grease obtainable having a definite proportion of soap in it. It will be obvious that the more soluble the soap is in the mineral oil, the less becomes the yield of grease obtained.

The melting point of the grease is also influenced largely by the character of the lead soaps present, and the following table shows some average melting points of lead soaps obtainable with different types of fatty acids.

MELTING POINTS OF LEAD SOAPS WITH DIFFERENT FATTY ACIDS			
Fatty Acid	Lead Soap	M.P.	°C.
Oleic	...	...	48.2
Caproic	...	...	73.1
Caprylic	...	...	84.4
Nonyllic	...	...	94.7
Myristic	...	...	106.5

Lead soaps produced from glyceridic oil, as distinct from fatty acids themselves, will, of course, contain glycerol. In many types of grease the presence of this constituent is not regarded as disadvantageous. It may even be looked upon as an asset, in that it tends to reduce the freezing point of the grease.

The presence of glycerol in certain greases designed for specific purposes is, however, undesirable and in such cases it is usual to work with fatty acid raw material, rather than undertake the recovery of the glycerol resulting from glyceridic raw material.

Grease Manufacture

In producing a batch of lead-based grease, two methods are available which differ fundamentally from each other. One of these consists of producing a mixture of lead soaps by acting on a glyceridic oil with litharge. The other involves the production of lead oleate from the sodium oleate, the lead oleate being then incorporated with a mineral oil to form a grease of the desired properties, in the same way as lead soaps from other materials are used.

A dark-coloured grease would be prepared, for example, by heating under pressure 72 per cent by weight of whale acid oil with 28 per cent of litharge. The resulting soap formed is then incorporated with from 4 to 6 times its weight of a suitable mineral oil according to the consistency desired. In

many cases a portion of the mineral oil to be used is heated with the raw materials in producing the soap.

A lighter-coloured grease, and a product with more standard characteristics, results from the use of lead oleate. In this technique, sodium oleate may first be produced by acting on oleic acid with caustic soda solution. To the sodium oleate is added a solution of lead acetate to obtain lead oleate, the latter being then dried to the required degree.

Lead oleate may also be produced directly from oleic acid by reacting the latter under pressure with litharge, and this process may take place in an atmosphere of CO_2 . The object in such a process is to produce as much as possible of the normal lead oleate $\text{Pb}(\text{C}_{17}\text{H}_{33}\text{COO})_2$, and the minimum amount of the basic lead oleate.

When litharge and oleic acid are reacted together the bulk of the product may consist of basic lead oleate. This oleate in grease making is not so desirable as the normal oleate, for the latter has the property of maintaining a suitable viscosity in the lubricant at low temperatures; a feature not possessed by the basic oleate, and the basic product also appears to have poor solubility in mineral oils.

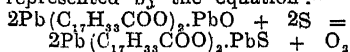
When carbon dioxide is present during the reaction, the CO_2 combines with the basic oleate to produce PbCO_3 and the normal oleate. In turn, the lead carbonate is attacked by the oleic acid to give normal lead oleate, carbon dioxide and water.

In commercial processing care is taken so that the proportion of unconverted litharge in the finished batch is as low as possible, because any appreciable amount of free lead oxide in the grease would rapidly induce wear of the bearings lubricated, and so defeat the object in view.

Lead Oleate and Sulphur

The use of sulphur in combination with lead-based greases has for some years been popular for some types of machinery; the sulphur being present in the form of sulphide in the grease. Such greases are extensively used in pressure lubrication systems.

In manufacturing the grease, a mixture of basic lead oleate, mineral oil and sulphur is heated to a temperature of between 150°C . and 160°C . for a period of several hours. The main reaction occurring may be represented by the equation:—



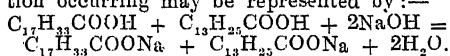
The chief feature in the manufacturing operation is careful control of temperature so as to produce the lead sulphide compound in a colloidal state. When the optimum

temperature is greatly exceeded there is a tendency towards the formation of a polysulphide of lead, and this gradually precipitates in the finished product, so rendering its lubricating properties largely ineffective. Finely divided sulphur is added in sufficient proportion to combine with only one atom of lead in the basic lead oleate.

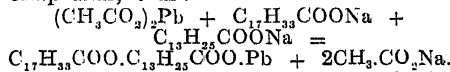
Naphthenic Acids

Naphthenic acids derived from petroleum have been successfully employed in the production of lead oleo-naphthenate to prevent "chatter" in certain types of machinery. The naphthenic acids are saponifiable and they can be made to yield sodium soaps, from which appropriate lead compounds may be prepared by treatment with lead acetate.

In industrial practice, a mixture of oleic acid and naphthenic acid is treated with caustic soda lye to produce the corresponding sodium salts of these acids. The reaction occurring may be represented by:—



The oleic acid may be replaced, when desirable, by either linolic or ricinoleic acid. Lead oleo-naphthenate is then produced by the action of lead acetate on the two sodium compounds, thus:—



The process is normally carried out in the usual type of steam-jacketed grease mixing vessel, equipped with a swing suction pipe. A mixture of oleic acid and naphthenic acids is placed in the vessel and stirred with about twice its volume of water. When thoroughly mixed, the mass is brought to a temperature of 50°C . Then the caustic soda lye, having a specific gravity of about 1.41 is run in slowly, while vigorous stirring continues.

The neutralisation point may be determined by the use of phenolphthalein, and the batch may conveniently be made slightly on the alkaline side, then acidified by adding a small amount of the two acids, so as to have a slightly acid product.

The temperature of the batch is then brought up to 80°C ., and with the stirrer in motion, a 50 per cent solution of lead acetate is run in; a slight excess of the acetate over the theoretical amount being used. Agitation of the mixture is continued for a short period and when the stirrer is stopped the lead compound slowly settles out, leaving a clear upper layer of liquid. This is waste and several water-washings are applied to the batch in the vessel. The product is then dried, before being incorporated with a mineral oil.

Vegetable Oils of Africa—II

French Project for New Oil Mills

PROSPECTS of developing the vegetable oil production in Africa caused the Direction du Plan (Ministry of French Overseas Territories) in collaboration with the IRHO (Inst. de Recherches pour les Huiles de Palme et Oléagineux) to decide in 1946 to send out a mission to investigate the possibilities and decide on the most suitable sites for erecting a number of oil-mills on or near the coast. The main factors in the problem and basic principles of policy underlying the scheme are briefly outlined and discussed in *Oléagineux*.

These relate in part to native interests, their frequent preference for other products (such as cocoa, bananas, coffee), international competition, and above all availability of oil-palm products of reasonable quality to keep the mills going. These latter depend in the initial stages on indigenous forest and possibly small native plantations; but larger plantations on the European model must be seriously considered sooner or later.

Small Units

In view of the fact that the native forests and plantations average only about 50 productive palms per hectare (2.47 acres) as compared with 140 in large plantations, and the yield from each barely exceeds 2 kilos oil as compared with 20 kilos or more in the Far East, these new French mills must necessarily be of the small or medium type. Thus, there will be installed two mills of 400 tons at Dabou, Ivory Coast, and Avrankou, Dahomey; two of 2000 tons at G'Bada in Dahomey, and Dihombari, Comoroun. Four of 1000 tons are planned in various parts of French West and Equatorial Africa, with provision for extension when possible, and erection of sterilising, etc., depots at suitable points to reduce transport charges and risk of spoilage. It is hoped that, with at least some of the extensions mentioned, capacity of the eight mills will be 40,000 tons per annum within two or three years.

Equipment will vary somewhat according to type of fruit, and of the processes used, the wet, continuous press, and solvent methods will probably be for the most part eliminated, in favour of centrifuging and hydraulic pressing. Orders for the required plant have been given to the Stork firm of Amsterdam, who specialise in oil-palm machinery. A layout of the proposed plant at Dihombari for palm oil production, is

described and illustrated, including two hydraulic presses and two De Laval centrifuges. The palm kernels are collected, dried, and stored, and are presumably exported or dealt with elsewhere.

It is proposed that the mills and their equipment should belong to the Colonial governors of the respective territories, representing the French government, and be administered by a management company under agreement with the governors. Principal terms of these agreements provide for local representation, allocation of 25-30 per cent of profits to improve plantations (fertilisers, etc.) and for native social services or welfare, payments to the natives (said to be very remunerative) based on oil content of fruit and its current value, and provision to avoid undesirable competition with other mills, private and independent. At the same time these new mills will not have an unlimited or uncontrolled monopoly.

Practical progress has been already made with four of the mills: at Dihombari, 18 km. from Doula by water; Avrankou, 35 km. from Port o-Novo; G'Bada; and Dabou in the Ivory Coast. Delays due to various causes, both in Africa and Europe, including labour and political difficulties in both Holland and France, have tended to postpone dates of completion.

It is hoped that the first mill to be ready, Dihombari, will commence operations in the summer of next year, and the last of the eight by 1950. The following improvements are anticipated: better quality oil by lowering the acid number from about 25 to 4 per cent; increase of fruit yields per kilo from 45 to 90 per cent; thus assuring to the native producer a more remunerative working day, say, from 3.5 kilos to 8 kilos.

Great Resources

That there is scope for these improvements and development generally may be deduced from the fact that the total area of oil palm forest in French Africa has been estimated at 3 million hectares (ha.=2.47 acres), containing roughly 300 million oil-palms, of which two-thirds are productive. Eventually, under better management, the proportion of sterile palms—at present about 30-35 per cent—should be substantially reduced.

(The estimate of 100 palms per ha. or about 66 productive, is substantially higher than previously stated for native plantations, i.e., 50 productive palms.)

SCARCITY OF CHEMICAL PLANT

Manufacturers Facing Unprecedented Demand

OF all the problems contributing to current supply difficulties throughout chemical industry, inadequacy of present plant and buildings and the impossibility of procuring quickly replacements of either constitute the chief barriers to greatly increased production. This was one of the circumstances to which prominence was given last week by speakers at the annual dinner of the Association of British Chemical Manufacturers (pp. 550-53 this issue).

In view of the implied criticism of chemical plant manufacturers, THE CHEMICAL AGE submitted to a representative authority in the industry the question why plant manufacture had apparently lagged behind other supplies. The answers, in the form of an interview reproduced here, help to clarify the problems with which chemical plant manufacturers are faced.

What Mr. Harold Wilson (President of the Board of Trade) said at the dinner of the ABCM, about the chemical engineering plant industry not being geared to reach the greatly increased level of production required of it since the war, is perfectly true. The demand and the rate of growth of that demand have been sudden; it is doubtful if any supply industry would have been capable of keeping pace with it.

Notwithstanding all the difficulties, there can be no doubt that the chemical plant manufacturing industry has expanded since the war; a number of firms have, in fact, expanded very considerably. But to assess what this development represents one has to remember that there exist obvious difficulties—the uncertainty whether building will be permitted, the shortage of machine tools, and, more embarrassing than all these problems, the shortage of steel and other essential components. Meanwhile, the demand for new chemical equipment since the war has been unprecedented.

Unparalleled Demand

This, of course, is a world problem. The demand for chemical plant has never remotely approached the current level. Other countries, increasingly anxious to become self-sufficient, are trying to build up in their own lands some of the basic industries, like chemicals. Nearly all need plant.

In attempting any review of shortage of chemical plant full weight must be given to the great contributory cause—the complete stoppage of supplies from Germany, from which country, before the war, came a large proportion of the world's supplies.

Thus in those countries needing chemicals, or which are attempting to manufacture chemicals for home consumption or for export, there continues this terrific demand for plant, and one of the traditional suppliers is no longer active.

Predominantly the chemical plant industry here needs more steel. So also do a lot of other industries, the making of electric motors—to mention only one—which are closely linked with chemical plant manufacture. All things considered, therefore, it may fairly be said that the chemical plant manufacturing industry is doing, and has been doing for a long while, a very good job of work.

Export Policy

The home chemical industry is not, as might be supposed, being sacrificed to permit the chemical plant manufacturers to export. Plant manufacturers are, of course, important exporters, but the industry is very conscious of the part it has to play in helping the home chemical industry, and is prudent in accumulating for itself a high dollar and other exchange potential.

There is abundant evidence that there exists very close co-operation between the two industries of chemical plant manufacture and chemical manufacturing, to the useful end of exchange earning which we have mentioned. The other side of the problem which has to be considered is the effect of sending plant to another country so that it can set up a chemical industry capable of competing with Britain and, in theory, reducing our own exports. That is evidently not desirable, but is it not a fact that, if a country has made up its mind to go in for chemical or any other manufacture, it will do so in any event? And if they cannot buy their plant here, they will assuredly go elsewhere for it. So, with the advantage conferred by the disappearance of the greatest pre-war competitor in this field—Germany—there is a clear duty for the chemical plant industry of this country to establish itself firmly in the new markets.

The measure of co-operation existing between British plant and chemical industries in regulating supplies is worth stressing. This has operated even to the extent of ensuring that the home manufacturers of specifically chemical plant are not saddled with an export target. It has to be acknowledged that the chemical plant manufacturers have had much assistance from the Government as far as lay in officials' power,

(Continued overleaf)

Scientific Films

Widening International Organisation

THE scientific Film Association, reviewing some of the results of the recently concluded International Scientific Film Congress, states that a wide-ranging programme for the coming year was prepared and among the special subjects for which sub-committees were set up were:—

1. The establishment of an international data card for compiling a master index of scientific films available throughout the world and the formulation of methods of appraisal of these films.

2. The joint production, by a number of countries, of films of common interest.

3. The exchange and distribution on the widest scale of scientific films and the customs regulations affecting such exchange.

4. The setting up of a Scientific Film Reference Library.

5. The exchange of information between nations by means of a regular journal.

The officers elected for the coming year are: President, M. Jean Korngold (Poland); vice-presidents: Mr. John Maddison (Great Britain), Mr. C. A. Burnmaster (Australia); hon. secretary: M. Jean Painlevé (France); hon. treasurer: M. Luc Haesaerts (Belgium).

The congress, says the association, has shown once again that the film is one of the most important means of disseminating knowledge. On this occasion, however, it must also be stressed that the film will have a major role to play in the joining of nations for the common purpose of progress, often transcending barriers of language, by the use of moving pictures.

SCARCITY OF CHEMICAL PLANT

(Continued from page 561)

the steel industry, which really seems to have the bit between its teeth has in the last two years done much to make recovery possible.

The export target that does exist is a joint one coupling "gas and chemical machinery"; this is how the figures for these two industries are presented in the official Board of Trade returns. And this joint target has more than been achieved. The monthly rate of exports in 1938 for these two industries jointly ("gas and chemical machinery") was £27,000. Now the monthly rate is £142,000, which is a little higher than the actual target to be achieved by the end of 1948. In considering these totals, however, it must be borne in mind that industrial plant figures do tend to fluctuate; at any given date allowance may have to be made for some big contract, which will completely transform the average export figures.

Pyrethrum in New Zealand

Investigation to Increase Yields

TWO further reports on growing pyrethrum are given in the New Zealand Journal of Science and Technology, Volume 29, No. 4 (December, 1947).

No. II report, by E. C. Chamberlain, assistant director, plant diseases division, and P. J. Clark, chemist, Dominion Laboratory, Department of Scientific and Industrial Research, deals with the selection of clones and pyrethrin content of flowers.

No. III, by P. J. Clark, Dominion Laboratory, E. E. Chamberlain, assistant director, and C. H. Proctor, technical assistant, Plant Diseases Division, Department of Scientific and Industrial Research, covers the factors influencing pyrethrin content of flowers.

The pyrethrin content of flowers of any one clone was found to vary from season to season, but in spite of fluctuations it remained consistently higher in some clones. Results showed that these variations make it possible to select strains which are of greater economic value than seedling plants.

The content of pyrethrin was shown by analyses to be progressive with the development from the bud to the fully-opened flower.

The effect of temperature during artificial drying of the flowers revealed there was a slight loss of pyrethrins when heated at 132°F. for nine hours, but low temperatures had no adverse effect.

When drying flowers it was found that humid weather was apt to infect them with a species of mould fungus which caused loss of pyrethrin content of 25 to 49 per cent.

The effect of locality on the pyrethrin content failed to establish the superiority of any one district, and the proportion of pyrethrin I to pyrethrin II was found to vary with different clones.

Austrian Mining Progress

A report published recently by the Austrian mining department shows that iron ore output aggregated during the first six months of the current year over 603,500 tons, as compared with about 336,000 tons in the same period of 1947. Coal production rose during the same period from roundly 1,455,800 to 1,709,100 tons. Copper ore output was more than doubled at nearly 18,000 tons and output of antimony ore rose from 560 tons in the first half of 1947 to 3060 in the same period of this year. There was a five-fold rise in graphite output from just over 1000 tons to about 5500 tons, and kaolin production was doubled to about 65,300 tons (29,100). A noteworthy increase also took place in the mining of magnesite.

CANADIAN COMMENTARY

Widening Interest in Titanium

THE development of vast titanium ore deposits in Canada (THE CHEMICAL AGE, Sept. 25) and increased production from deposits in the United States over the next few years are expected to free American industry from dependence on overseas sources for its raw material supply, stated the president of the National Lead Co., recently, whose firm is said to be one of the principal producers of titanium pigments. He said that the Kennecott Copper Corporation's recent announcement of plans to mine and smelt ilmenite-iron ores on a large scale in Canada was good news to the producers of titanium pigments.

* * *

Dominion Magnesium, Ltd., is stated to be producing a few lb. of titanium daily by pilot plant methods, but officials say the operation is such that commercial production in quantity could be established within a matter of weeks as markets develop. Samples have been supplied to industrial users, including General Electric, International Nickel, and the Bell Telephone Co. Dominion Magnesium produces titanium by a new process developed by Dr. L. M. Pidgeon, consulting metallurgist and professor of metallurgy at the University of Toronto, assisted by D. W. Rostrom. The method is said to give direct reduction of commercial pigment grade titanium oxide into titanium metal, the U.S. methods for producing the metal requiring an intermediate step. Products which Dominion Magnesium is now organised to produce include barium, strontium, calcium, magnesium and titanium. No magnesium has actually been produced since the war, as the company has been busily engaged reducing its large stocks inherited from war-time operations, but it is deemed necessary to resume production of the metal next year.

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An interesting study of the effect of abundant hydro-electric power on the growth and development of the aluminium industry in Canada is given in *Commonwealth Survey*, No. 8, dated October 2.

The great rivers of the country are mainly responsible for the existence of the industry, supplying not only abundant hydro-electric power but also providing water highways for the incoming raw materials and outgoing finished product.

Raw materials for the industry, apart

from sulphur from the United States, come from various parts of the Commonwealth. Bauxite is obtained from British Guiana, and fluorspar, used in smelting, comes from Newfoundland.

The rise in production was mainly brought about during World War II by the need for aircraft expansion. In 1938 production was 65,000 metric tons, which had increased to about 450,000 metric tons in 1943, the year of highest output. A natural decline followed with the end of the war, but figures for 1947 were 270,000 metric tons, or more than four times those of 1938.

Among exports, aluminium ranks about eighth in the country's list, the Commonwealth countries taking more than half.

* * *

The use in Canada in the trade year 1946-47 of a total of 657,282 tons of fertilisers of all types has been recorded by the Dominion Bureau of Statistics. Of this total, 561,464 tons were mixtures. Of the total tonnage of mixed fertilisers used, 60 per cent was of two grades: 176,647 tons of 2-12-6 grade and 164,986 tons of 4-8-10 grade. The 2-12-6 is by far the most popular for grain and farm crops and the 4-8-10 is the potato and garden crop grade. Other countries may be using more nitrogen for these crops, but so far Canada has not found this to be necessary. There is now relatively little organic nitrogen used for fertiliser purposes. Small amounts are supplied in some tobacco fertilisers, and a relatively small tonnage of bone meal, tankage and blood is sold. Canadian exports of nitrogen under International Emergency Food Council allocations during the year ended June 30, 1948, are estimated at 132,422 tons, as compared with the total domestic consumption of 27,000 tons.

* * *

Deliveries of heavy fuel oils to Canadian users totalled 1368 mil. gal. in 1947, as compared with 1074 mil. gal. in 1946, according to a compilation made by the Dominion Bureau of Statistics from reports submitted by refineries and their distributors and by major consumers. About 26 per cent of the 1947 total was for fuel in manufacturing plants and 2.9 per cent for material in manufacturing plants. In addition 25.6 mil. gal. of fuel oil and 1.2 mil. gal. of kerosene were shipped for export by Canadian refineries.

Technical Publications

A WIDE variety of uses is claimed for bacteriological peptone, a dried proteolysed muscle preparation, in a pamphlet issued by Evans Medical Supplies, Ltd., Speke, Liverpool. Bacteriological peptone (Evans) is a light coloured granular powder, free from fermentable carbons, and conforms with the requirements of the indole test. It has proved satisfactory as a constituent of liquid culture media for penicillin assays, streptomycin production, identification and differentiation of bacteriological strains, preparation of tuberculins, vaccines, dried cultures, and other purposes.

* * *

Some of the most impressive evidence of the extension of remote control and recording applied to the largest scale industrial units are presented in the current illustrated booklet issued by Evershed & Vignoles, Ltd., of Acton Lane Works, Chiswick, London, W.4. This is very largely a pictorial survey of some of the remarkable achievements in remote indication and centralised control and of the instruments by which they have been rendered possible. Docks at Sydney, and pumping and electricity undertakings here have contributed pictorial evidence of long-range control, without which the co-ordinated operation of some of the largest works would be almost impossible. The line drawings which are included provide a good deal of useful technology.

* * *

How many manufacturers and producers make the best use of the art of advertising? In a well-produced and attractive book entitled "The Work of an Advertising Agency," Mr. Robert S. Caplin (R. S. Caplin, Ltd.) deals efficiently with this problem (to quote his own words) "in such a way as to make a hard job easy to understand." He points out that the work of an advertising agency is most successful when least obvious. The book is divided into three groups covering all aspects of an agency's work—research and planning, creative production, mechanical production (blocks, type, vouchers, accounts, etc.) and public relations.

* * *

The power of photographs or illustrations to attract attention is well-known; watch any reader pick up a book or magazine, and he (or she) will invariably look at the illustrations first. Widnes Foundry & Engineering Co., Ltd., not only realise this, but also recognise that "a picture explains more

than a thousand words" is especially true of engineering products. Their latest publication "Fabrication of Steel" shows in a series of excellent photographs the company's ability to produce special purpose castings for the chemical, oil and allied industries. Among a variety of adsorbers, storage tanks, plate bending rolls, etc., the human side is illustrated by the picture of a woman war-time trainee, now one of the most skilled operators, at work electric arc welding in the constructional department.

* * *

"Products of the Chemical Division, Koppers Co., Inc." is the title of a bulletin just issued, listing all products offered for sale by this division of the Koppers Company. The bulletin, listing a number of new products introduced this year, presents the structural formula of each, together with brief information on properties, uses, and reactions. New products listed include six chemicals and two more thermoplastic moulding powders of the cellulose acetate and ethyl cellulose type.

* * *

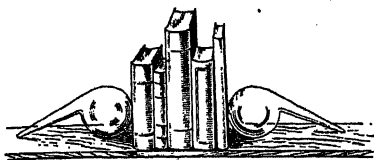
The publication of three new British Standards relating to coal tar by-products is announced by the British Standards Institution. They are: B.S. 1469/1948, Coal Tar Liquid Fuels; B.S. 517/1948, Cresylic Acid of Specified Orthocresol Content; and B.S. 521/1948, Cresylic Acid of Specified Metacresol Content.

* * *

A paper on the future development of the Japanese economy and the opportunities for British trade with Japan has been written by H.A. Macrae, C.M.G., M.B.E., formerly Minister (Commercial) at H.M. Embassy, Tokyo, who visited Japan in 1947, at the invitation of the Government. The paper was published this week for the Board of Trade (HMSO, 9d.).

* * *

Fansteel Metallurgical Corporation, North Chicago, Ill., is offering in a new bulletin five copper-base alloys for electrical and mechanical applications, other than resistance welding. They are said to possess desirable properties of greater strength, resistance to deformation and wear and higher elasticity than copper, brass or the common bronzes, retaining at the same time high thermal and electrical conductivity.



A CHEMIST'S BOOKSHELF

Organic Analytical Reagents. F. J. Welcher. (New York: D. Van Nostrand Company, Inc.). London: Macmillan and Co., Ltd. Vol. III, 1947, Pp. xi + 593. 44s. Vol. IV, 1948, Pp. xiii + 624, 44s.

The pleasure to a reviewer inspired by the appearance of this set of volumes is no less than was engendered by the first two volumes (*THE CHEMICAL AGE*, 1948, 58, 497.) The advantage of possessing the additional two volumes might be represented in terms not of arithmetical, but of geometrical progression.

It is to be assumed, though this is not explicit in the four volumes, that the work as originally planned is now complete, that is, in so far as such a work can ever be complete. The reviewer would, of course, rather regard this as the beginning of the author's work. Thus, to take only one example, the published work on cyclohexanedione-dioxime has been considerably extended since the author's self-imposed deadline of January 1, 1946. But it is to be hoped that supplementary volumes will, from time to time, keep the subject up to date. Such offerings will earn the heartfelt gratitude of analytical chemists throughout the world. This prospect may well be one reason for the omission of a general index to all four volumes, inclusion of which would, however, save a certain amount of mechanical labour and might therefore be included in the first supplementary volume. It is significant that the volumes have become progressively larger from I (although, by the use of thinner paper, Vol. IV is actually smaller than Vol. III), and the contents, of which a summary follows, are correspondingly enlarged in their range.

Vol. III contains sections on pyridine and its derivatives, quinoline and quinoline derivatives, dipyriddy and related compounds, pyrazolone derivatives, miscellaneous heterocyclic nitrogen compounds, dioximes, acyloin oximes, hydroxyoximes, monoximes of diketones, isonitroso compounds, nitroso phenols, miscellaneous oximes, cupferron and neocupferron, nitrosamines, rhodanine and its derivatives, carbazides, thiocarbazides and semicarbazides, carbazones, thiocarbazones and miscellaneous imino compounds. About 150 compounds are dealt with.

Vol. IV, which lists about 360 compounds,

is divided into chapters on acidic nitro compounds, the arsonic acids, the dithiocarbamates, the xanthates, miscellaneous sulphur compounds, sulphonic acids, sulphinic acids, seleninic acids, alkaloids, diazonium compounds, carbohydrates, miscellaneous natural substances, miscellaneous compounds, lake-forming dyestuffs, hydroxy-anthraquinone dyes, miscellaneous dyes, and dyes used in the detection of nitrite.

As a tailpiece, to render in terms of figures the enormous task which Dr. Welcher has so successfully accomplished, in nearly 2200 pages about 860 reagents are dealt with, these having been classified into 58 categories. In the four volumes, if the arithmetic of the reviewer can be trusted, no less than 9182 references to the literature have been given. Dr. Welcher might well have been forgiven if he had somewhere added yet a further reference—to the opening words of Q. Horatius Flaccus, *Carminum*, 3, 20 (*AUC* 730?)!

Dix ans d'application de la radioactivité artificielle. By Dr. Pierre Süe (Société d'Éditions Scientifique, Paris, 1948). Pp. 258. 675 francs.

The importance of radioactivity as a rapidly developing branch of science makes it difficult to keep up with the quantity of material produced on this subject. In his survey on the use of radio tracers Dr. P. Süe, research director in Prof. Joliot's Laboratoire de Chimie Nucléaire, gives a compilation of the writings up to 1947. In the main section material is arranged according to the subject of researches, and there is an excellent bibliography, which so far seems to have no equal in the English language.

Metals and Colours

The close affinity which exists between metals and colours is emphasised in the September number of the *Alloys Metal Review* issued by High Speed Steel Alloys, Ltd., Widnes, Lancashire. In an excellent article "Molybdenum and Tungsten in Fancy Dress," G. E. Hillier discloses how the introduction of these metals into the preparation of pigments has made many new colours available in paint, printing, rubber goods and plastics.

Europe's Hydrogen Peroxide

Data from Germany and Austria

PRODUCTION and use of hydrogen peroxide in Europe has been the subject of a number of reports recently; the latest, which has just been distributed in the U.S.A., deals with manufacturing processes in Germany and Austria.

Production in Germany before and during the war was recently the subject of an authoritative paper by V. W. Slater and W. S. Wood (*THE CHEMICAL AGE*, September 11).

German plants (with one exception), according to the report, used the potassium persulphate process, instead of the more recent ammonium persulphate (all liquid) method more usual in other countries. Germany had, however, developed production equipment for 82-85 per cent concentrated hydrogen peroxide, while only the pilot-plant stage had been reached in Austria.

Details are given of the persulphuric acid process, as well as flow charts, equipment diagrams, and a bibliography relating to all the processes described in the text.

Copies of the report, No. PB-88844 "Hydrogen Peroxide Manufacture in Germany and Austria," (pp. 72, \$2.00 per copy), may be obtained from the Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C.

Other reports issued by the Department of Commerce dealing with the same subject are: "Hydrogen Peroxide: Electro Chemische Werke," (PB-215, 17 pp., 25 cents); "Manufacture of Hydrogen Peroxide," (four reports; PB-78243, \$1.00; PB-38492, \$4.00; PB-38490, \$1.00; and PB-1737, \$1.00); "Hydrogen Peroxide for Milk Sterilisation," (P.B-31003, \$5.00, and PB-2461, \$35.00); and "Handling of High Concentration Hydrogen Peroxide," (P.B-42503, \$2.00).

ITALIAN CHEMICAL TRADING

THE chemical section of the Industrial Sub-Commission of Northern Italy has prepared the following plan for imports and exports of chemical products during the period July 1948 to July 1949. The totals are expressed in values (of million lire):

IMPORTS.—Essential oils, 386.6; gums and waxes, 1905; mineral salts and oxides, 1812; tar distillation products, 5463; plastic materials, 168; solvents and plasticisers, 195; tanning products, 39.5; pharmaceutical products, 1714.3; miscellaneous, 6699.2.

EXPORTS.—Carbide of calcium, 120; essences, essential oil, and synthetic perfumes, 2519; abrasives, 18.5; mineral salts and oxides, 1356.4; pharmaceutical products, 1500; photographic products, 1100; miscellaneous, 3800; dyestuffs, etc., 2700; plastic materials, 900; tanning products, 4800; boracic products, 123; caustic soda, 6000; carbonate of soda, 800; pyrites, 1440; sulphur, 1480; nitrates, 1790; Superphosphates, 120; alumina, 900.

German Technology

More News of Industrial Techniques

FURTHER reports on German industry are published to-day and may be seen at the principal public libraries, Chambers of Commerce and professional and scientific institutions. Copies may also be purchased from H.M. Stationery Office (Sales Office) or ordered by post (PO Box 569, London, S.E.1).

These are:—

BIOS 1776: Yeast and citric acid production from sugar-beet molasses (2s.).

BIOS 1781: Production of monomeric styrene at Chemische Werke, Huls (42s.).

BIOS 1783: German practice in the production and utilisation of high boiling coal tar chemicals (4s. 6d.).

BIOS 1789. Manufacture of salt-cake and hydrochloric acid in the Mannheim area and in Gravenbrueck (2s.).

BIOS 1790: Aluminium chloride and alkali-chlorine plants (9s.).

BIOS 1797: Centrifugal casting in Germany with particular reference to the production of non-ferrous tubes (6s.).

BIOS 1803. *Synthetic insecticides* (4s. 6d.).

BIOS/MISC. 103. Dutch report on visit to the German battery industry (1s.).

Other reports recently made available are:

FIAT 1298: The manufacture of 1, 4, 5, 8 naphthalene tetracarboxylic acid (1s.).

FIAT 1305: The Schmalfeldt process for making synthesis gas from methane (3s.).

FIAT 1314: The preparation of 2-methyl-5-ethylpyridine from methyl vinyl ether (1s.).

In addition to reports, a large library of original German documents is maintained by Technical Information and Documents Unit, German Division, Board of Trade, 40 Cadogan Square, London, S.W.1.

TRADE WITH THE BIZONE

THE recent commercial agreement between Italy and Bizone, Germany, which will be valid until June 30, 1949, comprises, among other things, the following Italian exports to Germany. The totals are expressed in values of thousand dollars:

Nitrate fertilisers, 1000; raw cork and cork parings, 650; olive oil (sulphided), 250; sulphur, 300; talcum, 280; bauxite, 500; various chemical products, 750; tanning extracts, 1300.

Among the products that Germany will export to Italy under the agreement are the following:

Refractory materials, 260; various earths, 255; benzol, toluol and xylol, 470; dyestuffs and pigments, 1500; pharmaceutical and intermediate products, 1250; various chemical products, 500; photo-gelatine, 150.

Home News Items

Town Gas Record.—A record sale of gas and a profit of £13,000 was reported by Warrington gas undertaking last year.

Change of Address.—The Information section of the Department of Scientific and Industrial Research has moved to: Rex House, Regent Street, London, S.W.1; telephone: Whitehall 9788. The chief information officer is Mr. Walter Hingston (Ext. 7). Headquarters of the department remains, at present, at 24 Rutland Gate, S.W.7.

U.S. Plan for British Refinery.—The project of Standard Oil of New Jersey to construct a large-scale oil refinery in Britain under Marshall plan auspices has been tentatively approved by the British Government. The refinery, estimated to cost £25 million, would be situated at Fawley, near Southampton, and on completion would be capable of refining 12,000 barrels of crude oil daily.

Rayon Plant for Poland.—After long negotiations between the Polish Purchasing Mission in London and Dobson & Barlow, Ltd., Bolton, Lancs., a contract has been signed of a value of £250,000 for the supply of "Nelson" continuous spinning plant—including a large part of preparation machinery—to produce $2\frac{1}{2}$ tons a day of continuous filament rayon yarn. This will be the first installation of British rayon spinning machinery in Poland.

New Research Laboratories.—The reconstruction of laboratories with modern equipment at Rowett Research Institute, Bucksburn, has just been completed and the opening ceremony is to be performed to-day (Saturday) by Mr. Arthur Woodburn, Secretary for Scotland. The reconstruction will enable scientists to employ new techniques in their work in the field of nutrition. The old Reid Library building will be utilised as a physiology department.

Coal Output Up.—The total British coal output last week was higher by 61,800 tons compared with the previous week. There were increases in both deep-mined and open-cast coal. Last week's figure of 4,228,000 tons (3,981,200 tons deep-mined, 246,800 tons open-cast) compares with 4,166,200 tons (3,930,100 tons deep-mined, 236,100 tons open-cast) in the previous week. The cumulative output of deep-mined coal for the 41 weeks of the year was, however, at 153,289,900 tons, still 1,941,600 tons below what it should have been to ensure the year's target of 200 million tons being reached.

Groundnut Scheme.—Considerable progress has been made in the Kongwa area since the visit of Mr. John Strachey, the Food Minister, in June. Bushland to the extent of 52,000 acres has been flattened out, nearly 40,000 acres contoured and almost 20,000 acres ploughed ready for planting.

Board of Trade's New Address.—The Board of Trade announces that from October 25 the address of the Directorate of Mica and Cork Section will be: 7th Floor, Horseferry House, Thorney Street, S.W.1. The telegraphic address of the Export Licensing Branch of the Board of Trade, Regis House, 43/46 King William Street, E.C.4, has been changed to Explic, Stock, London.

Gasholder Revolves.—The rotation at the rate of 1 in. a month of the Birmingham gas department's high-pressure storage holder at Longbridge is astonishing experts. The revolution is thought to be due to the action of the sun. Timely action by engineers prevented damage of inlet and outlet pipes which might have been caused by the movement and could have led to an explosion. The holder is cigar-shaped, 200 ft. in length, 25 ft. in diameter and weighs 460 tons.

TWO VIEWS ON STEEL

IT would be a national calamity if, in the near future, an upheaval took place in the British steel industry, said Lieutenant-Colonel J. P. Hunt, Master Cutler, Sheffield, at a general meeting of the Trades House of Glasgow last week. "Let those men who know the job get on with it," he added, "and do not muddle them." One of the things Glasgow and Sheffield had in common, he said, was their dependence to a large extent on steel for their prosperity. A considerable amount of the steel used in Sheffield was manufactured near Glasgow, and its quality was unbeatable.

* * *

The Minister of Health, Mr. A. Bevan, speaking at Gateshead last week, said the Labour movement was pledged to the nationalisation of steel and was going on with it. "I shall say no more about it now because I do not want to anticipate the deluge that is going to fall upon the steel masters when the argument starts. They have had it all their own way up to now. Restraint is very difficult, but when the debate starts the intellectual bankruptcy of the steel masters will be revealed."

Personal

The late MR. HARRY BREARLEY, discoverer of stainless steel, in his £80,000 will has left a large trust fund for a foundation to give promising youths a chance to study, travel, and advance themselves. Born in Sheffield, son of a crucible steel maker, the benefactor himself left school at eleven. He bought books and attended a night school until he qualified as a metallurgist and chemist.

MR. S. A. GREGORY, of the A.P.V. Co., Ltd., has just returned from a tour of four months in the Middle East, during which he has been studying the processing of agricultural products. Countries visited were Greece, Cyprus, Egypt, Iraq, Syria, the Lebanon, Palestine, and Turkey.

SIR LAURENCE BRAGG, professor of physics at Cambridge University, left Liverpool in the *Media* on October 16. He is to give 17 lectures during a tour of American universities.

MR. HERBERT REGINALD BEAUCHAMP has been appointed a director of Scottish non-Ferrous Tube Industries, Ltd.

CHEMICAL ENGINEERING LECTURES

A NUMBER of interesting lectures are scheduled to be given this term in the department of chemistry at the Sir John Cass Technical Institute, Jewry Street, Aldgate, E.C.3.

Commencing on October 29, a series of eight lectures will be given on Friday evenings at 6 p.m. on "Materials of Construction in Chemical Engineering." The first lecture will be stoneware and other ceramics by G. S. Shipley, followed by: stainless and other special steels—G. E. Speight; lead and its alloys—B. N. Reavell; copper and its alloys—S. Baker; aluminium and its alloys—W. K. B. Marshall; ferrosilicon alloys—R. V. Riley; plastics—J. Taylor; vitreous silica—G. E. Stephenson. The fee for the course is 15s. A further series of lectures "Unit Operations in Chemical Engineering" will be given in the second term, beginning in January, 1949.

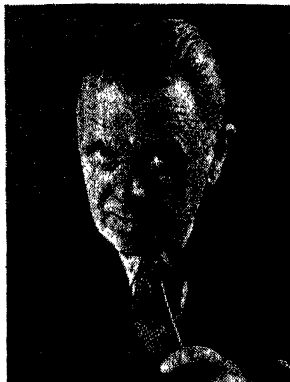
Applied statistics form the subject of a course of lectures suitable for graduates interested in the practical application of statistics to problems of manufacture and research. B. P. Dudding will give the first of eight lectures on "Statistical Methods in Industry" at 7 p.m. on Monday, October 25.

"Design of Experiments" will be the topic of eight lectures to be given by K. A. Brownlee in the new year, beginning on Monday, January 24.

The fee for either or both courses is £1.

Obituary

MR. ARCHIE SANDERCOCK, whose death is announced, was deputy chairman and deputy managing director of Glaxo Laboratories, Ltd., Greenford, Middlesex. Born at Teignmouth, S. Devon, in 1885, Mr. Sandercock was educated at Sidcup College and began his business career on the Stock Exchange. In the 1914-18 war, he rose from gunner to the rank of major. When hostilities ceased Mr. Sandercock joined the



Mr. A. Sandercock

board of Joseph Nathan & Co., the fore-runners of the present Glaxo organisation. Two years ago he was appointed deputy chairman and deputy managing director of the company. He travelled extensively in the firm's interest and had visited South America, Australia, New Zealand, Denmark, and Poland. Mr. Sandercock, whose home is at Budleigh Salterton, Devon, is survived by his wife and two children.

DR. HOWARD W. MATHESON, whose death is reported, at his home at Hudson Heights, Quebec, was formerly vice-president of Shawinigan Chemicals, Ltd., and a director of associated companies. He was a prominent figure in the chemical research field at was identified with many scientific and technical societies.

Research and Recovery.—The importance of research and the application of knowledge resulting from it was the theme of the speeches at the 29th annual meeting of the British Cotton Industry Research Association at the Shirley Institute, Didsbury. Sir Harold Parkinson, presiding, said that the textile industry as a whole was not making the most of the fund of knowledge at the institute.

Overseas News Items

Czech Glass Output.—The average monthly output of Czechoslovakia's glass works rose from 20,076 tons in the first half of 1947 to 22,194 in the first half of the current year.

Oil Search in Finland.—The Gulf Oil Corporation is reported to be searching for oil in the neighbourhood of Abo, Finland, in accordance with a recent concession agreement, states the Petroleum Press Bureau.

New Swiss Glass Works.—The Glaswerk St. Rupert A.G., which has recently been established in Niderhelfenschwil, Switzerland, is chiefly to produce lead crystal glass, which has so far not been manufactured in the country. Work is expected to commence towards the end of this year.

More Uranium Located.—For the second time in a few weeks uranium has been discovered in Southern California—by a plumbing contractor, while digging a swimming pool at his ranch at Costa Vesa. It is not yet certain whether it is in recoverable quantities.

New U.S. Ceramics Laboratory.—Work is in progress by United Clay Mines Corporation, Trenton, N.J., on the construction of a new research and technical laboratory for clay investigations. The work to be carried out will comprise intensive studies to develop clays for specific applications in various industries.

Oil Construction in Argentina.—The Argentine State Oil Fields invite tenders for the building of a lubricating oil refinery with an output of 100,000 cu. m. a day. The consumption of lubricating oils in Argentina has risen with the expansion of industry, improved transport and public services. Tenders are also invited for the supply and installation of a plant for crushing bauxite in the San Isidro factories.

New Spanish Oil Refinery.—It is believed that a new oil refinery will be erected at Cartagena, Spain, by the Caltex organisation (in which Standard Oil of California and the Texas Oil Co. have joint interests) and two Spanish companies. The National Industrial Institute, a body set up by the Spanish Ministry of Commerce and Industry, is to hold about 52 per cent of the shares, while 24 per cent will be in the hands of the Spanish oil company, C.E.P.S.A., the U.S. interests, which are to provide the equipment needed, holding the remaining 24 per cent. Initial daily capacity will be between 15,000 and 20,000 barrels, the crude oil to be shipped chiefly from the Middle East.

Nitrogen Fixation Plant for Bulgaria.—A nitrogen fixation plant is reported to be under construction at Dimitrograd, Bulgaria. Annual output of chemical fertiliser is to total some 65,000 tons.

Buna Production Ended in W. Germany.—The manufacture of synthetic rubber of the Buna type has been ended in W. Germany, the Hils plant having been converted to the use of natural rubber only.

Turkey to Increase Lignite Exports.—Turkey is planning to expand its export of lignite, considerable stocks of which have been accumulated recently for which no domestic use can at present be found.

New U.S. Porcelain Adherence Meter.—An improved portable instrument for determining the adherence of porcelain enamel to base metals has been announced by the Porcelain Enamel Institute, Washington, D.C., and adopted by the Institute as the standard "PEI Adherence Meter," states (U.S.) Ceramic Forum.

Reviving Tin Output.—Sufficient reconstruction has been carried out on the tin properties in the Netherlands East Indies that pre-war production capacities will probably be reached next year, according to the Netherlands Economic Bulletin. The Netherlands-Indies Tin Board has been set up in Batavia "to safeguard and co-ordinate the national interest in the exploitation, production and sale" of the metal.

Madagascar Graphite Mining.—American mining equipment and machinery, according to Paris reports, are to be sent to Madagascar to help increase output of graphite for the U.S. strategic stockpile. Graphite production, which had recovered to 15,000 tons per annum by the end of the war, had declined again during the political unrest of 1947, when installations were partly destroyed. It is hoped that by the end of next year some 7000 to 8000 tons of graphite will be available.

Stimulus for Vanadium.—The U.S. Atomic Energy Commission disclosed on October 16 that it was negotiating with the Vanadium Corporation of America to buy uranium from two ore treatment plants which were to be brought into operation by the Corporation next year. As a result, the commission foresaw a stimulus to the prospecting and mining of the vitally important ore in the western states of America. At present, much of the uranium used in the American atomic energy programme was from Canada and the Belgian Congo.

Next Week's Events

MONDAY, OCTOBER 25

Sir John Cass Technical Institute (Department of Chemistry). Jewry Street, Aldgate, E.C.3, 7 p.m. First of a course of eight lectures on applied statistics. B. P. Dudding: "Statistical Methods in Industry."

Manchester Federation of Scientific Societies. Institution of the Rubber Industry, Engineers' Club, Manchester, 6.15 p.m. E. R. Thornley and G. A. Pittman: "A Dynamic Compression Test for Rubber/Cord Fabric Adhesion."

Institution of Works Managers (Glasgow). Institution of Engineers and Shipbuilders in Scotland, 7 p.m. C. A. Oakley: "Some Aspects of Industrial Psychology as Applied to Works Management."

TUESDAY, OCTOBER 26

Royal Institute of Chemistry (London and South-Eastern Counties Section). The Cherry Tree, Welwyn Garden City, 8 p.m. T. S. Jones: "Polypeptide Antibiotics—Biological Polymers."

Institution of Chemical Engineers. Burlington House, London, W.1, 5.30 p.m. M. W. Thring: "Construction of models in which more than one process is similar to the original."

Sir Halley Stewart Trust. Memorial Hall, Farringdon Street, E.C., 6 p.m. First of a series of six lectures. Prof. M. L. Oliphant: "The Atomic Age. I—The Scientific Achievement."

Hull Chemical and Engineering Society. Church Institute, Albion Street, Hull, 7.30 p.m. H. R. Galleymore: "Synthetic Detergents."

WEDNESDAY, OCTOBER 27

Society of Chemical Industry. Food Group, London. Prof. A. St. Huggett: "Nutrition and Pre-natal Development."

Institution of Welding. Institution of Civil Engineers, Great George Street, London, S.W.1, 6 p.m. J. H. Paterson: Presidential address.

Manchester Literary and Philosophical Society (Chemical Section). Portico Library, Mosley Street, Manchester, 5.30 p.m. Dr. E. J. F. James: "Chemistry and Education."

THURSDAY, OCTOBER 28

The Chemical Society. Burlington House, London, W.1, 7 p.m. Sir Robert Robinson: "Strychnine, Brucine and Vomeline."

Royal Institute of Chemistry (Manchester). Reynolds Hall, College of Technology, 6.30 p.m. Sound film by I.C.I. Film Unit: "The Discovery of a New Pigment."

Institute of Metals (Sheffield). Grand Hotel, 6.30 p.m. W. H. Whympers: "Casting and Fabrication of Aluminium Alloys."

Royal Statistical Society (Sheffield). The University, 6.30 p.m. E. C. Fieller: "The Activities of the Mathematics Division of the National Physical Laboratory."

Pharmaceutical Society of Great Britain. 17 Bloomsbury Square, W.C.1, 7.30 p.m. C. H. Hampshire: "The British Pharmacopoeia, 1948."

FRIDAY, OCTOBER 29

Association of British Chemical Manufacturers, in conjunction with the Royal Society for the Prevention of Accidents. Grand Hotel, Harrogate. Safety conference (until October 31). Opening address by Sir Ewart Smith, of Imperial Chemical Industries, Ltd.

Royal Institute of Chemistry (London and South-Eastern Counties Section). Cambridge University, 8.15 p.m. Sir Charles Goodeve: "The Physical Chemistry in Iron and Steel Processes."

Sir John Cass Technical Institute (Department of Chemistry). Jewry Street, Aldgate, E.C.3, 6 p.m. First of a series of eight lectures on materials of construction used in chemical engineering. I. G. S. Shipley: "Stoneware and the Ceramics."

The Chemical Society (Glasgow). Joint meeting with the Andersonian Chemical Society and Glasgow University Alchemists' Club, Royal Technical College, 3.45 p.m. Prof. John Read: "Chemical Personalities a Century Ago."

The Chemical Society (Newcastle and Durham). King's College, Newcastle-on-Tyne, 5 p.m. Bedson Club lecture. Prof. Wilson Baker: "Recent Work on Systems of Aromatic Type."

Oil and Colour Chemists' Association (Manchester). Grand Hotel: Dinner and dance.

Royal Statistical Society (Birmingham). Chamber of Commerce, New Street, 6.30 p.m. C. Wainwright: "Statistical Principles in Quality Specification for Plastics."

Problems of Detergency.—Many examples of cleaning materials and a large range of insecticides will be displayed by Shell Chemicals, Ltd., on stands 168 and 169 in the National Hall gallery, Olympia, at the Public Health and Municipal Engineering Congress and Exhibition next month. A new insecticide to be displayed is a "tip dressing" used for control of insect pests in refuse dumps.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Receivership

LEE TEMPLE & Co., LTD., 15/17 Broad Street, Nottingham. (R., 23/10/48.) Mr. Louis W. Euler, C.A., 18 Low Pavement, Nottingham, was appointed receiver and manager on September 15, 1948, under powers contained in debenture dated April 9, 1945.

Company Winding Up Voluntarily

BRITISH AROMATICS, LTD., Manchester, and Ellesmere Port. (C.W.U.V., 23/10/48.)

The voluntary liquidation of the company and the appointment of Mr. E. C. Smith, F.C.A., and Mr. R. F. Bendall, F.C.A., as joint liquidators, with five representatives of creditor companies, was confirmed at a creditors' meeting in Manchester, October 5.

Company News

The address of **Silicon (Organic) Developments, Ltd.**, has been changed from 11 Cavendish Place, W.1, to Claver House, Wells Park Road, Sydenham, S.E.26.

The nominal capital of **Marshall Paints, Ltd.**, 186 Talbot Road, Blackpool, has been increased beyond the registered capital of £2000 to £10,000 in 3000 ordinary and 5000 cumulative preference shares of £1 each.

The nominal capital of **Petrocarbon, Ltd.**, River Plate House, 12/13 South Place, E.C.2, has been increased beyond the registered capital of £82,500 to £83,500, in 1s. ordinary shares.

New Companies Registered

Robert H. Ray Company, Ltd. (459,874).—Public company. Capital £3000. Directors: R. H. Ray and J. C. Pollard. Reg. office: 3 Frederick's Place, Old Jewry, E.C.2.

Atkaps, Ltd. (459,785).—Private company. Capital £5000. Manufacturing, analytical and consulting chemists. Subscribers: G. K. Ireland and L. Cork, 20 Copthall Avenue, E.C.2.

Polychemia (London), Ltd. (459,917).—Private company. Capital £100. Manufacturers of chemicals. Subscribers: Eileen Hawtin, Rosa Rosen. Reg. office: 203 Regent Street, W.1.

Goldmaster Industries Ltd. (459,941).—Private company. Capital £100. Manufacturers of plastics, rubber, latex, alloys and chemical compounds. Directors: L. Kirsch and O. Boehringer. Reg. office: 299 Upper Street, Islington, N.1.

S. C. Goodman, Ltd. (459,526).—Private company. Capital £500. Dealers in oils, petrol and chemical materials. Directors: S. C. Goodman (permanent) and Mrs. N. A. Goodman. Reg. office: Sutherland House, 29 Brighton Road, Sutton, Surrey.

Creedens, Ltd. (459,800).—Private company. Capital £1000. Manufacturers, importers and exporters of chemical or medical products. Directors: C. J. Asmussen and J. T. Rutherford. Reg. office: 18 Station Street, Walsall, Staffs.

Hector Products, Ltd. (459,946).—Private company. Capital £50,000. Dealers in all types of products obtained from whales. Subscribers: S. Stevenson and H. C. Hopkins. Reg. office: Moores Carson & Watson, 4 St. Mary Axe, E.C.3.

Better Limes Company, Ltd. (459,894).—Private company. Capital: £2000. Suppliers of limes, manures and fertilisers. Directors: E. H. Fotherby, J. E. N. Brough, E. C. Prosser, J. R. E. MacEachin. Reg. office: Central Chambers, Otley Street, Skipton, Yorks.

Townson Tankers, Ltd. (459,833).—Private company. Capital £5000. Manufacturers of storage tanks, port installations, etc. Directors: J. L. Townson and Mrs. E. V. Townson, both of 9 Huddersfield Road, Oldham. Reg. office: 9 Huddersfield Road, Oldham.

Chemical and Allied Stocks and Shares

BUSINESS in stock markets has been more active, largely owing to the new speculation in iron and steel shares, which reflected more hopeful views of compensation in the event of nationalisation. British Funds came in for profit-taking, following their recent rise, while earlier in the week buyers were awaiting issue terms of the British Electricity Authority's new loan. Transport 3 per cent stock receded and changed hands slightly below par, but later turned firmer, the lower price attracting buyers. Business in the industrial sections has been selective, and in most cases chemicals and kindred shares were well maintained.

Imperial Chemical have changed hands around 47s. with the new shares (20s. paid) at the new high level of 27s. Laporte Chemicals 5s. ordinary were 20s. 9d., Amber Chemicals 2s. shares 9s. 6d., Albright & Wilson 5s. ordinary 29s., while Monsanto Chemicals held their recent rise to 60s.

Buying of iron and steel shares has reflected the view that the value of assets

(estimated by arbitration as in the case of the colliery companies) and not the market value of shares, is likely to be the basis of nationalisation compensation. Share values cannot be taken as the basis, it is argued, because dividend limitation has kept recent dividends down to last year's rates. In the past many companies have had to face capital reorganisations in difficult times and consequently, in some instances existing issued capital now bears little relation to the value of assets or to earning capacity, particularly now that steel production is at its peak level.

Despite considerable profit-taking Norman Long at 34s. 6d. have risen well on balance for the week, while Colvilles were 38s. 6d., Stewarts & Lloyds 58s. 9d., and Guest Keen 49s. 3d. United Steel at 31s. 6d. were well up on balance, despite a good deal of profit-taking following news of the past year's big profit increase. Sheepbridge rose to 74s. on the assets segregation scheme. Staveley rose further to 94s.

Buying of Borax Consolidated was in evidence on the view that the company's American business and investments are yielding a bigger return; and the shares improved further to 62s. It is realised, however, that dividend limitation will prevent an increase in the company's distribution to shareholders at this stage. United Molasses have been steady at 47s. 7½d., and Lever & Unilever better at 50s. 3d. on the Anglo-Dutch taxation agreement. British Aluminium kept steady at 47s. 6d., and Metal Box shares changed hands slightly over £5. In other directions, British Match eased further to 33s. 9d. on fears of a moderate reduction in the forthcoming interim dividend.

Turner & Newall have been firm at 77s. 6d., with Triplex Glass favoured up to 24s. 6d., while British Plaster Board at 25s. reflected the better tendency in the building group, and Associated Cement strengthened to 73s. 9d. The big rise in profits helped British Celanese 10s. shares, which improved to 21s., although the dividend is unchanged at 8 per cent. Courtaulds firmed up to 39s. 6d.

Elsewhere, Boots Drug at 54s. 3d. were better, British Drug 5s. shares were 9s. 9d., Timothy Whites 38s., Sangers 31s., and Beechams deferred 18s. 4½d. Among shares connected with plastics, Erinoid were firmer following the dividend, but Catalin receded to 6s. on the decision not to make an interim payment. De La Rue were steadier at 39s. 9d. British Glues & Chemicals 4s. shares at 10s. 9d. were within 3d. of the level a week ago. Oils have strengthened after earlier uncertainty. Shell improved to 76s. 10½d. on the big 250 million dollar

financing scheme for Caribbean Petroleum, the Shell Royal-Dutch subsidiary. Trinidad Leaseholds at 52s. rose further in anticipation of the results showing a further increase in profits, although dividend limitation will keep the distribution down to last year's rate.

British Chemical Prices

Market Reports

THERE has been little of fresh interest reported on the industrial chemicals market during the past week. The movement to the main consuming industries has been on a substantial scale and in some directions the intake would be greater if the supply position permitted. Inquiries for shipment have also been numerous and the volume of actual export orders placed is thought to be not less than the average for recent weeks. In the soda products section there is a good demand for caustic soda, chlorate of soda, soda ash and bicarbonate of soda, and a steady inquiry is reported for hyposulphite of soda and for the phosphates. Formaldehyde is a good market at firm prices. The call for white lead and red lead continues strong at the higher price levels. Although supplies of cresylic acid are now easier, and the supply position of other coal-tar products is a little less tight, the market remains active with a good home demand at firm values. Export business in pitch and the creosote oils has been satisfactory.

MANCHESTER.—There has been no lack of inquiry on the Manchester chemical market during the past week from home users, merchants and shippers, and actual buying has been on steady lines with prices firm in virtually all sections. The call for actual deliveries of the general run of alkali products and other regular lines has been fully maintained compared with recent weeks and in several sections manufacturers are not finding it easy to meet requirements. Potash, ammonia and magnesia products are in good request. Most of the fertiliser materials are moving steadily to the consuming end, considering the time of the year, and a steady trade continues to be reported in the tar products.

GLASGOW.—In the Scottish chemical market conditions at present are very satisfactory and the volume of business during recent weeks has been higher than for some time. It appears that the increased activity is likely to be maintained. In the export market conditions have also been very satisfactory, and, in general, more orders have been received than heretofore. General comments of overseas buyers on prices and deliveries have been reasonably favourable.

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2. at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Distilling hydrocarbon tar and like oils and apparatus therefor.—J. P. Louniet. May 25, 1944. 608,595.

Hydrocarbon copolymers.—J. C. Arnold. (Standard Oil Development Co.) Aug. 2, 1945. 608,665.

Production of cyclohexane from hydrocarbon mixtures.—Anglo-Iranian Oil Co., Ltd., S. F. Birch, and C. B. Collis. Aug. 9, 1945. 608,605.

Recovery by distillation of cyclohexane from hydrocarbon mixtures.—Anglo-Iranian Oil Co., Ltd., S. F. Birch, and C. B. Collis. Aug. 9, 1945. 608,606.

Concentrating or dehydration of pharmaceutical and other liquids.—Radio Corporation of America. Oct. 3, 1944. 608,611.

Manufacture of ammonium nitrate.—Union Chimique Belge Soc. Anon. June 22, 1943. 608,612.

Polymerisation of vinyl compounds.—A. Boake, Roberts & Co., Ltd., and B. T. D. Sully. April 11, 1946. 608,635.

Process for rendering fibrous cellulosic substances, and articles made therefrom, fireproof.—Gyproc Products, Ltd., and C. G. F. Cavardino. Dec. 13, 1945. 608,668.

Plant for the production and heating of compressed air such as blast furnace air.—Für Technische Studien A.G. Feb. 22, 1945. 608,304.

Production of cellulose esters.—British Celanese, Ltd. March 2, 1945. 608,310.

Air-conditioning, cleansing, humidifying, disinfecting or deodorising apparatus.—B. Lipton. Feb. 20, 1946. 608,330.

Production of cured ethylene polymers.—E. I. Du Pont de Nemours & Co. Feb. 20, 1945. 608,333.

Process for the production of coloured artificial fibres and the like from normally solid ethylene polymers.—E. I. Du Pont de Nemours & Co. Feb. 20, 1945. 608,334.

Process for improving the properties of nylon fibres.—E. I. Du Pont de Nemours & Co. Feb. 20, 1945. 608,335.

Production of granules from compositions containing water-soluble sulphates.—I.C.I., Ltd., S. Fordham, and J. Taylor. Feb. 20, 1946. 608,336.

Shrinkage control of textiles and textile-forming materials.—American Cyanamid Co. March 9, 1945. 608,372.

Device for uniformly heating a liquid.—H. Glasbeek, Junr. Oct. 6, 1942. 608,376.

Preparation of asphaltic bitumen compositions.—N.V. de Bataafsche Petroleum Maatschappij. Nov. 3, 1942. 608,394.

Curing of polymeric materials.—E. I. Du Pont de Nemours & Co. Feb. 22, 1945. 608,414.

Treatment of dross.—National Smelting Co., Ltd. March 27, 1945. 608,442.

Multi-coloured synthetic gems and process for making the same.—Linde Air Products Co. March 17, 1945. 608,453.

Liquid fuel controlling means.—J. Lucas, Ltd., and R. J. Ifield. Feb. 25, 1946. 608,461.

Production and use of alkaline vegetable protein solutions.—Courtaulds, Ltd., A. F. Millidge, and C. L. Knight. Feb. 25, 1946. 608,464.

Purification and clarification of liquids.—L. J. Derham. Feb. 25, 1946. 608,468.

Preparation of anhydrous normally-liquid ethers for use more particularly in the production of silicone intermediates.—Metropolitan-Vickers Electrical Co., Ltd., W. K. Buchanan, and W. Simpson. Feb. 25, 1946. 608,478.

Preparation of derivatives of cholesterol.—Glaxo Laboratories, Ltd., E. R. H. Jones, A. E. Bide, and R. J. Nicholls. Feb. 25, 1946. 608,482.

Cation-exchange resins.—Permutit Co., Ltd., T. R. E. Kressman, and L. E. Holmes. Feb. 25, 1946. 608,516.

Production of azo-dyestuff images from asymmetrical N-aryl hydrazine photographic developers.—General Aniline & Film Corporation. Feb. 24, 1945. 608,520.

Apparatus for the administration of inhalant gas mixtures.—British Oxygen Co., Ltd., and W. Jones. Feb. 26, 1946. 608,536.

Conversion products of 2:3 dihydropyran.—I.C.I., Ltd., and J. G. M. Bremner. Feb. 26, 1946. 608,538.

Process for the oxidation of cyclic ethers.—I.C.I., Ltd., J. G. M. Bremner, and D. G. Jones. Feb. 26, 1946. 608,539.

Production of tetrahydrofurfuryl alcohol.—I.C.I., Ltd., F. Starkey, and J. G. M. Bremner. Feb. 26, 1946. 608,540.

Basic refractory products, in particular basic refractory linings for furnaces, and parts of furnaces, and process for obtaining same.—Commentry, Fourchambault et Decazeville. Oct. 31, 1941. 608,544.

Bleaching cellulosic textiles.—Mathieson Alkali Works. May 16, 1945. 608,547.

Polymerisation of coumarone and indene.—J. Wilkinson & Son, Ltd., and R. Y. Eagers. Feb. 26, 1946. 608,548.

Coating composition.—W. H. Holst, and G. R. Hersam. Sept. 23, 1944. 608,654.

Preparation of catalysts.—I.C.I., Ltd., J. G. M. Bremner and S. Beaumont. Feb. 27, 1946. 608,697.

Treatment of tetrahydrofurfuryl alcohol.—I.C.I., Ltd., J. G. M. Bremner, and D. G. Jones. Feb. 27, 1946. 608,565.

Manufacture of highly polymeric carbamates.—I.C.I., Ltd., J. W. Batty, and H. P. W. Huggill. Feb. 27, 1946. 608,698.

Manufacture of aerating powders and calcium pyrophosphate compounds.—A. Bird & Sons, Ltd., and R. Russishvili. Feb. 28, 1946. 608,708.

Insecticidal compositions.—Ashe Laboratories, Ltd., and M. D. Price. Feb. 28, 1946. 608,715.

Coloured fluorescent materials and articles.—British Celanese, Ltd. March 1, 1945. 608,725.

Continuous electrode furnaces.—Det Norske A/B for Elektrokemisk Industri. March 3, 1945. 608,656.

Apparatus for delivering measured quantities of liquids.—Theo & Co., Ltd., and D. Smith. March 28, 1946. 608,570, 608,571.

Production of insulating materials.—British Celanese, Ltd. Feb. 3, 1943. 608,753.

Manufacture of N-substituted ino-difatty acid amides.—J. R. Geigy A.G. May 13, 1943. 608,935.

Cutting and embossing machinery for plastic sheet material.—T. & T. Vicars, Ltd., and J. F. Naylor. July 26, 1944. 608,848.

Diluents and coating compositions containing such diluents.—Heresite & Chemical Co. Oct. 18, 1943. 609,027.

Production of organic nitrogen compounds.—I.C.I., Ltd., and C. W. Scaife, and H. Baldock. [Legal representative of H. Baldock (deceased).] Dec. 11, 1944. 608,758.

Resin products and preparation thereof.—Borden Co. Nov. 30, 1943. 608,940.

Process for refining the grain of magnesium base alloys.—Magnesium Elektron, Ltd., and F. A. Fox. Dec. 29, 1944. 608,941.

Process for refining the grain of magnesium base alloys.—Magnesium Elektron, Ltd. (Basic Magnesium Inc.) Dec. 29, 1944. 608,942.

Modification of hydrocarbon materials, more especially liquid hydrocarbon lubricants.—J. C. Arnold. (Standard Oil Development Co.) Jan. 17, 1945. 608,854.

Production of magnesium base alloys.—Magnesium Elektron, Ltd. (Basic Magnesium Inc.) March 6, 1945. 608,945.

Alloy.—J. C. Arnold. (Coast Metals, Inc.) March 9, 1945. 608,858.

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The Anglo-American Council

THE presence here this week of six representatives of American industrial management and labour and one "neutral," Mr. Stanley A. Holme, to study in conference with their British counterparts means, of raising productivity in the United Kingdom cannot fail to stimulate a certain amount of heart-searching among those who are considered answerable for the maintenance of industrial vigour in our main departments of production. While it was perhaps a foregone conclusion that cotton, one of the great preoccupations of the Board of Trade and an industry in which the U.S.A. has every reason to be interested, would be singled out as one of the first subjects for study, the close affinity of chemical industry with this and other basic activities renders it fairly certain that chemical production here will receive some share of attention. The participation of the vice-president of the Association of British Chemical Manufacturers, Sir Frederick Bain, as one of the four FBI members on the Anglo-American committee, seems to be an assurance that the fundamental importance of a fuller output of industrial chemicals will be recognised, and at the same time that what is being achieved and what impedes a very much greater flow of chemical materials will be fairly represented.

It may well be a source of considerable satisfaction to Sir Frederick Bain that he will need to make no apologies on behalf of the chemical industry. The export figures since plants all over the country began their reconversion to supply peacetime requirements are sufficient testimony that industrial chemistry has made exceedingly good use of whatever material was available to it in a severely limited and unbalanced economy. The current returns, showing that in September exports by all the chemical groups were worth £0.5 million more than the very satisfactory total a month before (incidentally compensating exactly the reduction in the same period of sales by the cotton industry) and the unqualified recognition recently given by the President of the Board of Trade of the full contribution which chemicals have made towards balancing the trading account are less than half the evidence that Sir Frederick Bain could produce, had justification been necessary. Direct exports, are not the first claim on the industry and, if it were possible to express in monetary terms the saving in imports, even the £40 million total of exports recorded in the first half of this year would seem trivial by comparison.

In whatever discussions are now in progress of British chemical production in the

On Other Pages

Leader :

The Anglo-American Council ... 575

Notes and Comments :

Socialising Steel ... 577

Motives ... 577

Sulphurous Smoke ... 577

Good Publicity ... 578

Too Efficient? ... 578

Chemical Exports Rise Again ... 579

Anglo-American Productivity Council ... 580

Work on Alizarin ... 580

British Survey of U.S. Industry ... 581

U.S. Seeking Strategic Materials ... 582

OEEC Production Proposals ... 582

Nationalising Steel ... 583

More German Dismantling ... 583

New Carbon Black Factory ... 583

First Synthetic Glycerol Plant ... 584

Forming Ceramic-Metal Compounds ... 586

German Viscometry ... 587

The Training of a Chemist ... 589

Electron Microscopic Studies ... 592

More Barium Chloride ... 592

Allocation of Isotopes ... 592

Mr. J. Davidson Pratt ... 592

Vermiculite in South Africa ... 593

Rubber Seed Oil ... 594

Iranian Production Plan ... 594

Personel ... 595

Obituary ... 596

Next Week's Events ... 598

light of American achievement, two facts will be evident. The first is that British chemical industry, using only a very small proportion of the wealth and material lavished in the U.S.A. on advancing technology and "application research," has achieved a greater degree of self-sufficiency than that of almost any other country whose industry had suffered wartime and post-war disruption. The other is that any hopes that may be entertained in American chemical industry of finding widening markets here are likely to be disappointed. Even in the field of petroleum chemicals and industrial solvents, in which the impressive progress by American industry could entitle it to expect precedence as a supplier, current expansion here, although much of it has still to reach the production stage, seems more likely to contract than to expand some existing East-West trading.

The Anglo-American Productivity Council is, of course, not concerned with balancing trading arrangements and conspicuously was not briefed to foster American interests. The Americans are undoubtedly disinterested, in so far as any nation bearing the peculiar responsibilities of the U.S.A. can be to-day.

Mr. Philip D. Reed, the American

chairman, and other American representatives on the council, emphasised at the Press conference on Monday that the visits to British industrial plants which would follow this week's meetings in London would not in any sense be investigations or inquiries. He said the U.S. delegates did not claim to be primarily production engineers, but were men with a broad background, who, by seeing something of British industry would be able to equip themselves more intelligently to work out a programme with their British friends on the council. The American side of the council, he said, approached this job with considerable humility. They recognised that they were not familiar with conditions here or the special problems in Britain which had no counterpart in America. But there were indications that there would be areas where they could learn from us and where we could apply some of the American technique and successful experience on production.

Not the least promising result of this new liaison may be the transatlantic exchange of representatives, of workpeople as well as of managements, to see how the other fellow deals with common problems, the possibility of which was referred to by Sir Frederick Bain.

NOTES AND COMMENTS

"Socialising Steel"

OVERSHADOWING all else in the present shape of industrial affairs, the Government's irrational determination to nationalise the steel industry during the current Parliamentary Session strikes a jarring note in the picture which many are contributing to present of united effort towards greater production. It is now inevitable that much Parliamentary time, and effort both inside and outside the House, will be canalised to the campaign to force through a measure which, at the best, is entirely irrelevant to the urgent industrial and economic needs of the moment and, if the experience of State control in another basic industry is any precedent, may have disastrous results in which nearly every major department of production would be involved. While there is, of course, no prospect that the Government will be deflected by any appeal to reason or expediency to defer this testimonial of its faithfulness to party doctrine, the evidence thus afforded of its readiness to set aside all consideration of the immediate needs of the nation is a grotesque commentary on the widespread co-operation to raise industrial output and a very poor compliment to the aid now being proffered by representatives of both sides of American industry. It was noteworthy that the nationalised coal industry has been excluded from the discussions of the Anglo-American Productivity Council.

Motives

NO one has yet had the temerity to claim that by nationalisation the steel industry will be enabled to surpass the mounting production totals which have characterised its performance for more than two years and twice enabled it to surpass the annual production targets. In the absence of any intelligible justification in Parliamentary quarters of what is proposed, the country will be obliged to accept the version offered last week-end by the Labour Party. According to this, iron and steel must be a State industry because it is "basic," is a restrictive monopoly and is not as efficient as it could be. If the validity of those reasons is accepted, an equally good case might well be presented

for nationalisation of nearly every other of our essential industries, and especially perhaps of chemical industry—whose intimate dependence upon steel has recently been again brought prominently to the fore. Such a corollary is doubtless in accordance with the Socialist view of industrial progress in the immediate future. The other view, which observation fully supports, will see in this in its latest tribute to party doctrine grim possibilities of limited output and industrial discontent which could make impossible the achievement of the higher export levels proposed this week.

Sulphurous Smoke

THE country is faced with the necessity of producing more coal; a large majority of the population, both domestic and industrial consumers, knows this and probably believes it. Industrial users, chemical manufacturers and chemical engineers among them, are continually being urged by the fuel authorities—whose theoretical matter is wholly admirable, unlike their administration in the past of the actual material—to economise on coal, one current recommendation being that they should use a greater proportion of lower grade coal. An interesting and informative study of the whole subject of coal utilisation just published by the National Smoke Abatement Society, is "Guilty Chimneys," containing some well authenticated and arresting information on the "heedless extravagance" involved in the present-day general methods of burning coal, and suggests some remedies, of which the treatment of processed fuel rather than raw coal seems likely to receive increasing encouragement from now on. For readers of *THE CHEMICAL AGE*, who do not require to be told what is involved in the coal combustion processes and the continuing atmospheric pollution with sulphuric and sulphurous and other chemicals, much of the matter in this attractive booklet is, of course, of a kind which, in effect, preaches to the converted. The following extract, however, may well serve as a conclusion toward which all current discussion points: "In present circumstances an increase in coal production is a necessity, but should be regarded only as a temporary and re-

grettable expedient. Scientifically, it is more desirable to employ manpower and materials for a limited period in providing the means to use coal more efficiently than permanently in producing more coal for further wasteful consumption." Few chemical engineers will quarrel with that statement, but they are well entitled to ask that the contribution by domestic consumers to fuel economy and reduction of broadcasting of chemicals *via* the chimney should now be raised to a level approaching what has been done in industry. Of the 2.4 million tons estimated to be emitted yearly domestic and other small users are held to be responsible for 1,290,000 tons. General industry is "in the black" only to the extent of 700,000 tons.

Good Publicity

HOW effective an instrument of propaganda a specialised periodical can be, not only for its own trade, but for its country, is well shown by the *Czechoslovak Glass Review*, published every second month. The current issue maintains the usual high standard; it is well-printed on high quality paper, with excellent half-tone blocks in black and white and sepia, and one full-page in colour. This raises the interesting problem of representation

of our own industries abroad. Can the glass industry, for instance, send to Europe printed in the language of the country concerned, any kind of publication capable of upholding the prestige of any one English craft, as effectively as does the *Czechoslovak Glass Review* for its own industry? Here perhaps is an instance in which the Arts Council of Great Britain might aid the country's exports by helping the various trades and crafts to be appreciated overseas.

Too Efficient

STANDING, it might seem, as a footnote to underline the extremities of absurdity that may be reached once the principal of private enterprise has been condemned by the administration is the recent prosecution in Leeds, which in itself, has nothing to do with chemical industry. The victim was a Leeds clothing firm which has been fined £5000 for earning a profit higher than the margin fixed by the Board of Trade, despite the fact that its goods were sold below the regulation prices. Such a paradox might well have been conceived by the late W. S. Gilbert, but as a commentary on the current official demand for greater efficiency here, there and elsewhere it is a grim joke.

1949 Target for Chemical Exports

THE intensification in 1949 of obstacles to continued expansion of United Kingdom export trade is foreseen in this week's statement by the Board of Trade in which it is announced that the level expected to be reached by exports as a whole by the end of that year is 55 per cent more than that ruling in 1938. The level tentatively proposed six weeks ago by the President of the Board of Trade was 5 per cent higher (160 per cent of the 1938 figure).

The figure now proposed for "chemicals, etc." by the end of next year is £9 million monthly, equivalent to 206 per cent of the exports prevailing in 1938. The corresponding figures for the current year are £8.05 million and 184 per cent.

The BoT statement mentions that "The end-1948 target of 150 per cent of the 1938 volume is within sight of achievement. Most of the export categories are expected to record further increases during 1949, but in some cases the targets have had to be reduced below the end-1948 figures, largely because of severe import restrictions abroad

and growing competition for overseas markets.

"In certain cases, we shall still be unable to meet the full demands of our overseas customers, owing to the continuing shortage of raw materials—a consideration which applies particularly to the engineering industries (due to steel shortage), as well as to exports of chemicals, coal, food, drink and tobacco. In this connection defence may further limit the availability of scarce materials for use in export industries."

Among the figures now published, representing "the Government's preliminary views of the targets to be achieved by the main groups of industries," are the following: Coal, £6 million monthly, representing 57 per cent of the 1938 figure; iron and steel manufactures, £8.5 million (116 per cent); non-ferrous metals and manufactures, £4 million (182 per cent); machinery, £24.48 million (223 per cent); silk and rayon, £4.5 million (251 per cent); chemicals, £9 million (206 per cent); coke and manufactured fuel, £600,000 (75 per cent); oils, fats and resins, £1.3 million (121 per cent).

CHEMICAL EXPORTS RISE AGAIN

September Total was £875,091 More Than Last Year

BRITISH chemical manufactures exported in September, excluding drugs and dyestuffs, reached the high total value of £4,334,005, which represents an increase over August of £186,336 and £875,091 more than the figure for September, 1947. Sodium compounds again showed a substantial export rise, sodium carbonate registering 334,828 cwt. (September, 1947, 243,320 cwt.),

caustic soda 258,370 cwt. (97,459), sodium silicate 23,920 cwt. (4378 cwt.). Coal showed proportionately the largest individual increase with 1,066,972 tons (£3,939,351) compared with the very low level of 113,935 tons (£251,397) in September, 1947. Exports of potassium compounds were more than doubled by comparison with 1947, totalling 11,367 cwt.

CHEMICAL EXPORTS

	Sept. 1948 Cwt.	Sept. 1947 Cwt.
Formic acid	3,286	1,836
Salicylic acid and salicylates ...	254,382	148,814
Tartaric acid	2,398	234
Value of all other sorts of acid ...	£67,820	£61,987
Aluminium oxide	125	1,010
Sulphate of alumina	2,034	2,269
All other sorts of aluminium compounds	445	355
Ammonium sulphate	33,057	35,287
Ammonium nitrate	6,538	5,232
All other sorts of ammonium compounds	1,957	1,619
Bleaching powder	60,076	43,457
All other bleaching materials ...	17,707	4,590
Calcium carbide	10,271	6,119
Benzol	290	9,198
Cresylic acid	168,020	200,397
Tar oil, creosote oil, anthracene oil etc.	2,810,660	1,172,900
Value of all other sorts of tar oil ...	£26,832	£46,194
Naphthalene	6,684	1,780
Collodion cotton	1,283	1,505
Copper sulphate	435	946
Disinfectants, insecticides, etc. ...	62,706	87,996
Fertilisers	1,756	745
Glycerine	3,339	343
Nickel salts	5,350	2,479
Lead acetate, litharge, red lead, etc.	8,223	3,402
Magnesium compounds	797	662
Methyl alcohol	13,404	157,455
Potassium compounds	11,367	4,980
Salt	21,316	13,210
Sodium carbonate, etc.	334,828	243,320
Caustic soda	258,370	97,459
Synthetic sodium nitrate	2	20
Sodium silicate	23,920	4,378
Sodium sulphate	16,089	16,026
All other sodium compounds ...	89,171	77,313
Cream of tartar	92	821
Tin oxide	359	635

	Tons 1,768	Tons 923
Zinc oxide	...	...
Total value of chemical manufactures, excluding drugs and dyestuffs	£4,334,005	£3,458,414
Quinine and quinine salts	192,206	182,001
Acetyl-salicylic acid	118,051	88,427
Insulin	753,192	133,404
Penicillin	323,340	172,042
Total value of drugs medicines and preparations	£1,380,326	£1,391,129
Total value of dyes and dyestuffs ...	£761,304	£853,704
Plastic materials, other than casein and celluloid, etc.	32,792	22,445
Value	£407,326	£255,637
Chemical glassware	1,279	1,117
Value	£45,513	£40,534
Furnace plant	258	1,333
Value	£58,664	£140,775
Coal	1,066,972	113,935
Value	£3,939,351	£251,397

CHEMICAL IMPORTS

	Sept. 1948 Cwt.	Sept. 1947 Cwt.
Acetic acid	15,851	9,886
Boric acid	4,980	4,500
Tartaric acid	3,216	1,364
All other acids	22,950	36,600
Borax	31,535	398
Bromine and bromides	10,442	3,786
Calcium carbide	603	644
Coal tar products, excluding benzol and cresylic acid ...	...	...
Cobalt oxides	...	...
Ammonium phosphate	570	552
Arsenic	9,983	4,718
Fertilisers	...	...
Iodine	...	...
Potassium chloride	801,136	576,881
Potassium sulphate	8,576	33,340
All other potassium compounds ...	5,371	6,821
Sodium nitrate	69,790	...
All other sodium compounds ...	6,777	18,710
Carbon black	106,567	106,415
Total value of chemicals, drugs dyes and colours	£2,692,196	£2,243,137

Anglo-American Productivity Council

Industrial Discussions Opened in London

SIR FREDERICK BAIN, M.C., president of the Federation of British Industries and vice-president of the Association of British Chemical Manufacturers, took the chair at the Press conference in London last Monday which followed the first meeting of the Anglo-American Productivity Council. The American members of the council are to stay in Britain a fortnight.

Sir Frederick Bain, who is also joint chairman of the British section of the council, said it had been decided that the council's terms of reference should be to exchange views on the ways, through ERP and otherwise, in which U.S. industry could co-operate in assisting British industry to promote greater productivity.

Capital Equipment

Among the subjects discussed at the council's meeting that day, he said, had been capital equipment, investment and so on, quantity versus quality production, the meaning of productivity in relation to output, production costs and the general questions of specialisation and standardisation.

Questions were invited, and answering one of these, Sir Frederick Bain said it was quite likely that British members of the council would be paying a return visit to America. It was also likely that some British workers would be going to the U.S.A. An exchange of workpeople between the two countries was definitely going to be considered. No details had been decided, but the Americans were in favour of British workers gaining experience in their factories.

Mr. Philip D. Reed, chairman of the U.S. section and other American representatives on the council, emphasised that the visits to British industrial plants which would follow this week's meetings in London would not in any sense be investigations or inquiries. Mr. Reed said the U.S. delegates did not claim to be primarily production engineers, but men with a broad background, who, by seeing something of British industry, would be able to equip themselves more intelligently to work out a programme with their British colleagues on the council. The American side of the council approached the job with considerable humility.

The work of the council was not a question of miracles; production never was. It was really a case of a great many approaches carefully and methodically carried out. They recognised that they were not familiar with conditions here and the special problems in Britain which had no counterpart in

America. But there were indications that there would be areas where they could learn from the British and where the British could apply some of the American technique and successful experience on production.

Mr. J. Spencer Love, an American textile representative, said that, while there were many differences between the British and American industries, it was his belief, that, given the same raw materials, the same machinery, the same leadership and the same incentives, British industry could vie with any other in the world.

Questions were asked about the position of the nationalised industries in relation to the council's inquiries, it being pointed out that there were no representatives of the management of any nationalised industry on the British side of the council, which represented solely the TUC, the FBI and the British Employers' Confederation.

Sir Norman Kipping, director-general of the FBI, and one of the three joint secretaries of the council, said they were concerned mainly with discussing productivity in an industrial sense, and such things as transport and electricity came rather outside the scope of this. Coal was the only nationalised industry with the sort of problems that the council would be discussing, but it had been decided not to deal with coal. But they would try to study a representative cross-section of British industry apart from coal.

WORK ON ALIZARIN

ENGLISH and American scientists, working together in the United States, are reported to have found a new process that promises to increase production and relieve the current shortage of alizarin-type dyestuffs. Using simple and inexpensive equipment, the scientists are stated to have fused a material called "silver salt" with lye in the presence of kerosene. A simple distilling kettle, functioning at ordinary pressures, removed water from the product. Even with present mass production techniques, two days are required to produce dye from alizarin, but with the new and cheaper method the co-operating scientists are stated to have produced it in a few hours. Among those co-operating in the work were Indian-born Dr. Vaman R. Kokatnur, an industrial chemist who holds many chemical patents in the U.S.A., and Mr. Siddarth Lalbhai, the son of a leading textile manufacturer in India, who has now returned to his native land after doing graduate work in the U.S.A.

BRITISH SURVEY OF U.S. INDUSTRY

Heavy Chemical Production and Prospects

Ha "best seller," compiled by 25 Britons in the Washington Embassy under the direction of Sir John Magowan, the British Commercial Minister to the United States. It is an economic survey of the United States completed in February last.

The bibliography lists 67 sources of information besides the official help the mission received from U.S. government departments, in the production of this 207-page book, the aim of which is to help British industry to earn dollars.

Hard facts are not evaded in the section reviewing British industrial marketing policy. Industrialists are told to "go and see for yourself; send your workpeople as well as your salesmen. Give service; co-operate; advertise; keep landed prices low and quality high. You have to sell in competition with the keenest and most efficient large-scale manufacturers of the world in their own vast home market." And much more.

There is in addition a mass of carefully pruned and selected information, qualified by the admonition: "Reports . . . cannot carry the same conviction as personal experience and observation."

Discussing the potentialities of the chemical industry of the U.S.A. it is stated that the estimated 2.4 billion dollars worth of extra plant built for the Government is largely a reflection of new technical development rather than a duplication of existing plant. The examples given lay emphasis on the development of chemicals from petroleum instead of from coal and the virtually new development of magnesium production from seawater.

Outlet for Surplus

Fears that U.S. civilian market would not be able to absorb the swollen productive capacity of the war were soon dispelled, say the experts. "The high level of industrial and agricultural activity since the war has kept basic chemical plants working at as near full capacity as supplies of labour and materials allowed.

"Demand has been particularly heavy on fertiliser manufacturers, oil refineries, the paper and pulp industries, rayon, and plastics producers and the glass using industries and further plant expansion has been undertaken on a considerable scale.

"New plant construction on a large scale is normal in the chemicals industry on account of the high rate of obsolescence caused by technological advance.

"At present the need for new capacity is being considerably accelerated by the general change in the nature of the industry.

"Whereas before the war the industry was largely engaged in producing chemicals required for the processing of other commodities, it is now, to a considerable extent manufacturing such commodities as plastics, rayon and synthetic rubber which are themselves end products and bulk materials."

Volume of Chemicals

So the British experts, recalling the considerable expansion undertaken during the war to meet the U.S. chemical requirements for ordnance factories, synthetic rubber and chemical warfare, point out that the U.S. during 1946 and 1947 has been through many shortages and production difficulties. They give an indication of the volume of production of some of the more important chemicals over 1944-7 in this table form:—

	1944	1945	1946	1947
		(Million Gal.)		
Cresosote oil	163	162	142	161
		(Million Lb.)		
Glycerine, refined high gravity and yellow distilled	97	90	64	92
Glycerine (chemically pure)	99	84	84	100
Acetic acid (synthetic and natural)	332	293	313	386
Acetic anhydride	494	526	522	624
Carbon dioxide	893	871	862	967
		(Thousand Short Tons)		
Synthetic anhydrous ammonia	541	549	726	1,088
Nitric acid	471	447	574	796
Phosphoric acid	692	718	901	1,036
Sodium silicate	428	411	412	476
Sulphuric acid	9,262	9,553	9,318	10,553
Sodium sulphate, Glauber's salts and salt cake	800	755	695	825

At the end of 1947 the supply of most basic chemicals in the U.S.A. was below current demand, while production difficulties were encountered, such as uncertainties of coal supplies (affecting principally organic chemicals and industrial alkalis), transport and labour difficulties.

One of the worst shortages (persisting throughout 1947) was of soda ash, caustic soda and chlorine. Demand for these had been particularly high because of the needs of the glass industry (normally consuming 30 per cent of total soda ash supplies) and the paper, textile, aluminium, petroleum products and other chemical industries.

Another shortage of post-war—of carbon

(Continued overleaf)

U.S. Seeking Strategic Materials

Details of Munitions Board's Prospective Purchases

THE realisation by America of the need to maintain and increase her strong and strategic position is emphasised by a report dated September 13 from Mr. W. D. Wallace, Assistant Commercial Secretary to the Canadian Embassy in Washington (*Foreign Trade*, October 2). Provision for purchases amounting to \$300 million has been made for the Munitions Board to accumulate essential defence materials. Only \$87 million have been spent to date but it is proposed that goods for the remaining \$213 million shall be obtained during the present fiscal year.

The present three-month purchase plan calls for delivery before June 30, 1949, of commodities in substantial amounts to be contracted for in this quarter. These items are shown in the accompanying table.

Under provisions of the Economic Co-operation Act, the ECA is authorised to use at least 5 per cent of its currency accounts in ERP countries to purchase materials for the stockpiling programme. The Director of the Strategic Materials Division of ECA recently visited Europe to see whether the production of raw materials could be increased to allow some to be exported to the U.S.A. Among the materials under discussion were manganese, rubber, tin, copper, zinc, hemp and sisal, industrial diamonds, nickel, graphite, talc, uranium, tungsten, vegetable oils, chrome and quinine. An agreement was concluded with the United Kingdom to purchase 25,000 tons of high-grade rubber and 2000 tons of sisal. A number of critical materials are not being accu-

mulated because storage problems outweigh the advantages of storing them. Among these are radium, uranium, certain types of asbestos, optical glass, leather, iron ore and petroleum products.

Asbestos			
Chrysotile ...	...	1,100 short tons	
Amosite ...	...	1,900 "	"
Bauxite			
Metal grade ...	...	435,000 long dry tons*	
Abrasive grade ...	...	68,000 "	"
Beryl ...	...	250 short tons	
Bismuth ...	...	100,000 lb.	
Cadmium ...	...	300,000 "	
Castor Oil ...	...	15,000,000 "	*
Chromite			
Metallurgical ...	...	30,000 long dry tons*	
Refr. Type A ...	...	1,250 "	"
Coconut Oil ...	...	5,000,000 lb.	
Columbite ...	...	1,100,000 "	*
Copper ...	...	30,000 short tons	
		(from commercial channels)	
Graphite			
Amorphous lump ...	...	1,000 short tons*	
Flake (crucible) ...	...	300 "	"
Flake (lubricant) ...	...	500 "	"
Kyanite ...	...	1,000 short dry tons	
Lead ...	...	16,000 "	"
Manganese Ore			
Battery ...	...	20,000 long dry tons*	
Metallurgical ...	...	350,000 "	"
Mica			
Muscovite block ...	...	80,000 lb.*	
Muscovite film ...	...	125,000 "	*
Muscovite splittings ...	...	1,000,000 "	*
Phlogopite splittings ...	...	120,000 "	*
Monazite ...	...	500 short dry tons*	
Nickel ...	...	15,000,000 lb.*	
Palm oil ...	...	7,000,000 "	*
Pepper ...	...	1,000,000 "	*
Quinidine ...	...	6,000 oz.	
Natural crude rubber ...	...	25,000 long tons	
		(from commercial channels)	
Shellac ...	...	1,500,000 lb.	
Talc, block ...	...	250 short tons*	
Tin ...	...	4,500 long tons*	
Zinc ...	...	16,000 short tons	

*Expected total for the year

BRITISH SURVEY OF U.S. INDUSTRY

(Continued from page 581)

black—was principally the result of unprecedented demand for rubber tyres.

Between September, 1945, and December, 1947, general chemicals showed a 29 per cent price rise and in the fertiliser materials section prices rose 41 per cent.

In plastics, the British experts forecast a rapid development of demand from the automobile and textile industries.

"An interesting development beginning to take place in the industry is the bridging of the existing gap between thermoplastic and thermosetting materials. The advantageous higher molding speeds enjoyed by thermoplastics are now being approached by some of the thermosetting materials while the great heat resisting properties of thermosetting plastics are being, to some extent, developed among the thermoplastics."

OEEC PRODUCTION PLAN

A EUROPEAN recovery programme for the year July 1, 1948, to June 30, 1949, to be carried out with the estimated Marshall Aid of \$4875 million (£1219 million), to be made available during this period, has been handed by the Organisation for European Economic Co-operation to Mr. Averell Harriman. The proposed increases in production under various categories, expressed as percentages, are as follows: Coal, 13.7; steel, 50; pig iron, 68; petroleum, 39; aluminium, 37; copper, 16; lead, 78; zinc, 45; tin, 38 nitrogenous fertilisers, 27; potash, 29; bread grains, 45; beet sugar, 26; wood pulp, 23; electric power, 10. The production of rock phosphates in North Africa will be 170 per cent greater than the average annual production in 1935 to 1938.

Nationalising Steel

Bill Published This Week

THE main legislation in the new session of Parliament is the proposal to nationalise the steel industry referred to in the King's Speech as "A measure will be laid before you to bring under public ownership those companies extensively engaged in the production of iron ore, or of pig iron or steel, or in the shaping of steel by a rolling process."

Mr. Eden, speaking for the Opposition, emphasised that they were unalterably opposed to the proposal of nationalisation. The Government's action, he said, was ill judged and ill timed, and they would do all they legitimately could in the House to resist the passage of the Bill. Should the measure become law in the life of the present Parliament, it would, of course, be an issue at the next General Election. He took the opportunity to make it absolutely clear that, should the Opposition be victorious at the polls, they would consider themselves entirely free to repeal any such legislation.

FILTER MEDIA STANDARDS

THE British Standards Institution has published B.S. 1438: 1948, which prescribes the requirements for media used in biological percolating filters for treatment of sewage, water, and certain trade waste waters.

The function of the medium in a percolating filter is to provide an extended surface to serve as a support for the organisms, including bacteria and fungi, which bring about the purification of polluted liquids supplied to the filter. Many different materials have been used satisfactorily as filter media including coke, clinker, gravel, crushed stone, and slag.

Experience has shown that the most important factors governing the suitability of medium for use in a percolating filter are durability, uniformity of size, shape of the pieces of medium, cleanness, nature of surface, chemical inertness, and mechanical properties. The specification makes provision for assessing these qualities and provides methods of sampling, of analysis and of testing.

At present there is a lack of quantitative data on some of these factors and it is not yet possible to lay down rigid requirements for all of them. Further experience in the field may make it desirable to amplify the present standard at a later date.

Copies of the standard may be obtained from the British Standards Institution, Sales Department, 24 Victoria Street, S.W.1 (2s. 6d. post paid).

More German Dismantling

I.G. Farben Equipment Scheduled

NOTING that there is an important distinction between "will be allocated" and "declared available for repatriation from Germany," the Office of International Trade of the U.S. Department of Commerce announced last week that in the near future the Inter-Allied Reparations Agency will allocate as reparations among the Western Allied Nations, including the U.S.A. 23 German war and industrial plants. Among them are several suitable for the production of chemicals and allied products. These and their location and production facilities, are:—

Beulter und Co., Lahr (Dinglingen), activated carbon; Chemische Fabrik Weinheim, Ingelheim am Rhein, activated carbon; I. G. Farben, Ludwigshafen, pyrolydione (complete shop); I. G. Farben, Ludwigshafen, amino sulphonic acids (part of shop); I. G. Farben, Ludwigshafen, liquid sulphur dioxide (part of shop, fabrication and liquefaction from sulphuric acid); I. G. Farben, Ludwigshafen, anhydrous aluminium chloride (part of shop comprising one refining installation); and I. G. Farben, Appau, formamide (less than a complete section without distillation; production is by reaction of ammonia on methylformate, produced by reaction of carbon oxide on methanol).

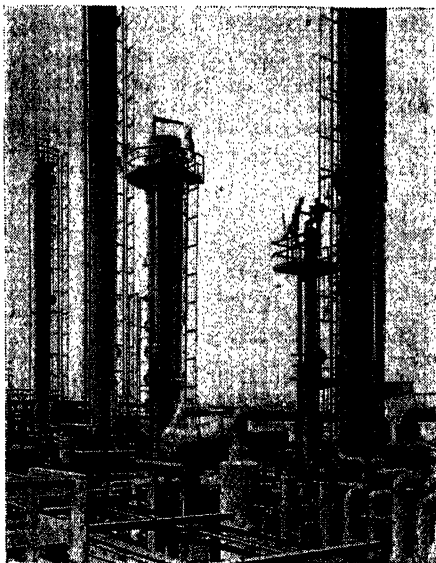
Among the remaining plants, suitable for the production of armaments, metallurgical products, optical instruments, machine tools, hoists and winches, boilers and radar equipment, are the following:—

Gusstahl Fabrik Fr. Krupp, with two machine shops, at Essen; Dynamit A.G., Empelde-Hannover; H. Walter K. G., Beimoor Weg, und Hagen, Ahrensburg; Maschinen fuer Massenvorpackung G.m.b.H., Luebeck; J. Schneider Optische Werke, Goettingen-Weende; Duerkopp Maschinenbau G.m.b.H., Kuensbeck, near Bielefeld; Espera-Werke A.G. (Wilhelm Rheinhold), Wanne-Eickel; Franz Berrenberg, Haan; Lauf, Bungen and Winneberg K.G., Muehlheim-Ruhr; Roehren und Schweißwerke, form G. Kunze, Herne; Albert Schaefer, Recklinghausen; Danzigerwerft, Hamburg; Th. Rose K.G., Hamburg-Altona; Funkstrahl, Konstanz; and I.G. Farben at Ludwigshafen, in addition to the I.G. Farben plants mentioned above.

New Carbon Black Project

Referring to the carbon black factory to be built on Merseyside (THE CHEMICAL AGE, October 23), Godfrey L. Cabot, Inc., of Boston, Massachusetts, U.S.A., disclosed last week that several River Mersey sites were under consideration.

A Board of Trade official in London said that, contrary to general belief, the factory would be relatively small. It will employ approximately 100 workers and constructional work will begin early next year.



Distillation equipment used at Houston in the production of allyl chloride

ON September 16, 1948, the Shell Chemical Corporation opened officially the world's first synthetic glycerol plant at Houston, Texas. This marks the first time since its discovery by Scheele, 170 years ago, that glycerol has been made commercially by synthesis.

Employed in the manufacture of high explosives, surface coatings, and some 1500 other applications, glycerol has become a heavy chemical in its own right whose availability as a by-product of soap manufacture may no longer be looked upon as a satisfactory sole source of supply. Its synthesis or preferential production from non-animal origin has been attempted in a number of ways. These attempts range from the classical German glycerol production by fermentation during the first World War to laboratory syntheses from vinyl chloride, formaldehyde, allyl alcohol, etc.

The process employed in the \$8 million plant of the Shell Chemical Corporation starts from propylene which can be produced in huge quantities from petroleum hydrocarbons. The synthesis can be brought about by two routes involving similar

FIRST SYNTHETIC GLYCEROL PLANT

Basis of Innovation

From a Special Correspondent

techniques and showing nearly the same economy. (see formulae below)

In both cases the most difficult step is the economical production of allyl chloride, and the solution of this problem is perhaps the most important single development incorporated in the new plant.

Development of the entire process represents the fruit of nearly 10 years' study in the laboratories and pilot plants of Shell. It is expected that the present plant will be able to operate economically and compete successfully with the production of glycerine by the splitting of animal fats.

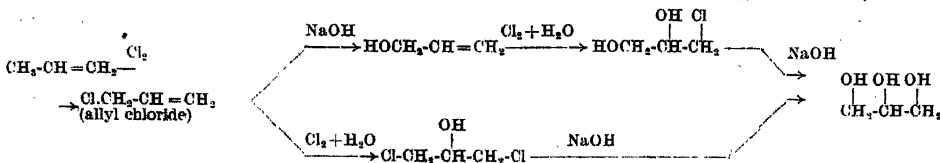
The margin of profit is, however, not great and optimum conditions had to be carefully established. An excellent report on the development of this process has been published by E. C. Williams (*Trans.-A.I.Ch.E.*, 37, pp. 157 ff.).

The production of allyl chloride from propylene is a somewhat unusual reaction. All the textbooks assure us that chlorine will attack the double bond of olefines preferentially. Shell learned to chlorinate the methyl group of propylene by operating at elevated temperatures and in the absence of a catalyst. Temperatures of 500°C. and higher are required for this reaction.

A suitable excess of propylene is maintained, the mole ratio of propylene to chlorine being about 7:1. Yields of allyl chloride as high as 85 per cent can be obtained. The remainder consists chiefly of dichloride as well as a α - and β -chloropropylene.

For the production of allyl chloride, propylene of 98 per cent purity is quite satisfactory. This grade is, of course, easily obtained by rectification of cracked refinery gas. As long as the temperature is kept between 500° and 580°C., the reaction time is not critical and considerable freedom is therefore given in the design of the reaction chamber.

The reaction products are first freed of hydrogen chloride by water scrubbing. The organic chlorides are removed by a kerosene wash and are then separated by fractionation. The residual propylene is recycled to



the chlorination reactors, which it enters, preheated to 400°C. by the outgoing products of the reaction.

The hydrolysis of allyl chloride to allyl alcohol is carried out continuously at 150-160°C. A pressure of about 200 lb. p.s.i. is necessary in order to maintain a liquid phase. The allyl chloride concentration in the aqueous solution is of greatest importance. If it is too dilute, the reaction equipment will be unduly large and recovery costs of the alcohol may well become excessive. On the other hand, a concentrated solution will result in large formation of diallyl ether. The optimum concentration is determined by compromise and is about 1.25N, i.e., corresponding to about 5 per cent NaOH as the hydrolysing medium.

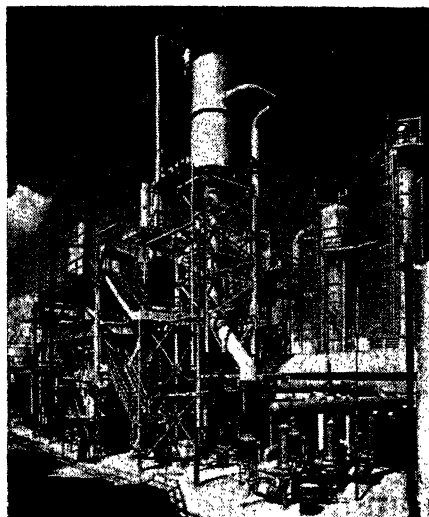
The third factor of prime importance in the hydrolysis reaction is the alkalinity of the solution. By using sodium carbonate instead of sodium hydroxide, the ether formation is successfully repressed well below 10 per cent. However, the evolution of CO₂ results in undesirably high pressure. Only a small amount of sodium carbonate is therefore employed and the proper pH is restored by successive additions of caustic soda, to keep CO₂ in solution. An alcohol yield of more than 90 per cent can be obtained. The allyl alcohol is readily recovered in its azeotropic (71 per cent) composition by simple stripping.

The design of the hydrolysis reactors must be carefully handled. There must be no overhead pockets in which allyl chloride can collect. A local accumulation of allyl chloride would result in sufficient hydrolysis and local acidity to introduce a serious corrosion problem.

The allyl alcohol is readily chlorohydrinated in dilute solution by contact with gaseous chlorine. Because of the exothermic nature of this reaction, which is controlled at 20-25°C., provision must be made for removing the heat evolved. This can be effected by trickling the aqueous allyl alcohol solution through a chlorine filled tower and recycling part of the product after intermediate cooling in a shell-and-tube heat exchanger. Starting with a 5 per cent solution of alcohol in water, 92 per cent yields of the chlorohydrinated allyl alcohol are readily obtained.

The product of this reaction is hydrolysed without intermediate purification. Aqueous alkali containing 10 per cent NaOH and 1 per cent Na₂CO₃ gives the best results. Preferred operating temperature is 150°C. with a contact time of 30 minutes. About 95 per cent yield can be attained in the hydrolysis.

The crude glycerol is concentrated to 85 per cent in flash evaporators. Further purification to 99 per cent is effected by a combination of solvent extraction (with xylene) and vacuum fractionation.



The initial concentrating and desalting equipment in the preparation of a semi-concentrated glycerine

The alternate and equally effective method for the production of glycerol from allyl chloride, as outlined in the set of equations shown, has also been worked out by Shell. The allyl chloride is directly chlorohydrinated. By close control of the pH and by avoiding the presence of gaseous chlorine in the system, it is possible to get yields of glycerol dichlorohydrin in excess of 95 per cent.

Glycerol dichlorohydrin can be hydrolysed in essentially the same manner as the chlorohydrinated product of allyl alcohol. In the present case, it is, however, equally possible to effect one-half of the hydrolysis by treatment with lime in a stripping column. The resulting glycerol epichlorohydrin is distilled overhead and is readily hydrolysed to glycerol by treatment with caustic soda and soda ash. This process results in a saving of nearly one-half of the caustic consumption by the substitution of lime.

The glycerol manufactured by the Shell Chemical Corporation meets the very stringent specifications of the U.S. Pharmacopeia. The material is water-white, odourless, and assays more than 99 per cent glycerol.

The availability of a competitive process for the manufacture of synthetic glycerol will, without a doubt, have important economic consequences. Its further development will tend to stabilise the glycerol supply and price and make it less dependent on the vagaries and fluctuations of the meat packing and soap industries.

Forming Ceramic-Metal Compounds

The Use of "Cermets" in Jet Engines

A SUBJECT of increasing interest to chemical engineers and to those concerned with jet-engines is the employment of ceramic-metal compounds, to describe which the word "cermets" has been suggested.

The term is meant to include not only oxides and metal combinations, but any mixtures such as oxides, carbides, nitrides, borides, and silicates on the one hand, and metals and alloys on the other, states G. A. Bole, Research Professor of Ceramics at the Ohio State University Engineering Experiment Station, in an article entitled "Cermets" in the (U.S.) *Ceramic Forum*.

High Temperature Combination

"Cermets," he writes, are the result of the wedding of ceramics with the metals. The combination of the two takes place at high temperature under controlled atmosphere. The reaction of these two dissimilar materials produces a product that has properties quite different from each alone. The metals are malleable, while ceramics are brittle. The "cermets" are much less brittle than the ceramic constituent, but distinctly less malleable than the metals.

The ceramic components are quite resistant to oxidation at high temperatures, while the metals are subject to oxidation. Intergranular corrosion is a disease of metals at abnormal temperatures, while the ceramics are highly resistant to high temperature breakdown. "Cermets" are resistant to oxidation and apparently resistant to intergranular corrosion.

The spall resistance of ceramics is very poor, while the metals resist heat shock ideally. The "cermets" lie between these two values. They will actually become stronger on heat treatment, but the best of the "cermets" have only a fraction of the strength of the metals at room temperatures. The outstanding property of "cermets" is that they have a strength at high temperatures in advance of the constituent metals, and are nearly as strong as the constituent oxides.

The techniques used in forming the laboratory specimens more nearly resemble those of powder metallurgy than ceramics. We have found it necessary to control the furnace atmospheres very carefully. These atmospheres vary all the way from a slightly oxidising to a highly reducing atmosphere. Other techniques are employed *in vacuo*. The various gases used may be argon, helium, nitrogen, hydrogen, and water

vapour when a slightly oxidising atmosphere is desired.

All metals have a characteristic and measurable vapour pressure far below their melting points. Advantage has been taken of this fact in the coating of both metals and oxides. In the laboratory, the reaction is carried out under a bell jar in a nearly perfect vacuum. In this way, an extremely even coating can be produced. When an oxide and a metal are vapourisable at the same temperature, a coating can be laid down constituting a "cermet." Other techniques are employed when the vapour pressure of the oxide and the metal are at different intensities.

One manufacturer is impregnating a ceramic with a metal in the liquid phase, thus producing a "cermet" with a high strength at elevated temperatures. The vapour phase reaction is probably a factor in this process, also.

Coatings have been developed and bodies built up by flame spray techniques for laying down and for flame curing "cermets." From these illustrations, it is evident that "cermets" can be produced in various ways, and it is likely that many more processes will be developed as time goes on. Any one or all of these techniques give promise, each where a particular set of conditions is required.

Establishing a Bond

Any method of forming, to be successful, must take cognisance of the idea that there must be a bond between the ceramic and the metal. This is the crux of the development. Years ago, the enamellers were faced with the same problem of establishing a bond. Recently a company making enamel specialities noted that the metal stock, with a very slight degree of oxidation, enamelled better than a brilliantly clean metal.

It is now found that an atmosphere containing a few molecules of oxygen per million parts of atmosphere (gas) is required to produce a satisfactory bond. In the development of "cermets," it is evident that there is a very large number of combinations with special properties that can be produced by varying the available components with a wide variety of atmospheres and firings on various heat schedules.

Ideal Home Exhibition.—The 26th *Daily Mail* "Ideal Home" Exhibition will be held at Olympia from March 1 to March 26, 1949.

GERMAN VISCOMETRY

New Apparatus for Very Heavy Liquids

THE investigation of viscosity and flow of very viscous liquids and plastic masses, e.g., oils and fats, at normal or low temperatures, requires instruments which can be used with high flow resistances; and which also permit study of the relation between flow and shear stress with repeated tests of the same sample. They must in fact be able to deal with liquids not conforming to the Newtonian laws.

Such an instrument has been designed in the German Office of Weights and Measures, Weida, in Thuringia, and is described by H. Willenberg and W. Fritz (*Angew. Chem.*, B, 1948, 20, 134-9). An earlier instrument which was also designed to over-

cipies, and consists essentially of two cylinders A in Fig. 1 of 25 mm. inside diameter connected by a capillary C. The

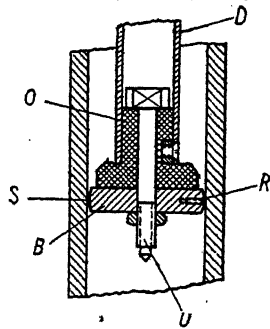


Fig. 2

liquid to be tested is forced from the first cylinder by a loaded piston into the second (first stroke) through the capillary, and by movement of a piston in the cylinder back again into the first (second stroke). These movements can be repeated.

After moving piston B out of the way, the liquid is poured until cylinder A is half-full. By means of piston B the material is forced to and fro through capillary C.

The other parts of Fig. 1 are probably self-evident: FF are flat discs to carry the load applied, G an upright support, and T a mm. scale. Piston B is shown in greater detail in Fig. 2. The left-hand side of Fig. 1 is of course in section, while the corresponding right-hand side shows an external view.

The instrument is immersed in the alcohol bath of a thermostat cooled by evaporation of liquid air, and the whole layout is shown in Fig. 3, in which K is insulated cover, L is evaporator, P the applied load, and Q a Dewar vessel.

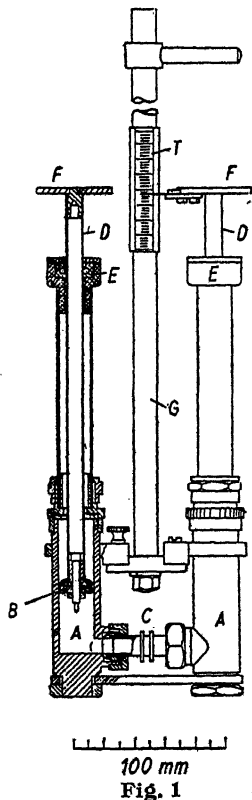


Fig. 1

come existing difficulties in the usual methods was the subject of a dissertation by Hennenhofer (Dresden, 1945). This was a capillary viscometer, driven by compressed air, and operated in a cold chamber. The new device is based on simple prin-

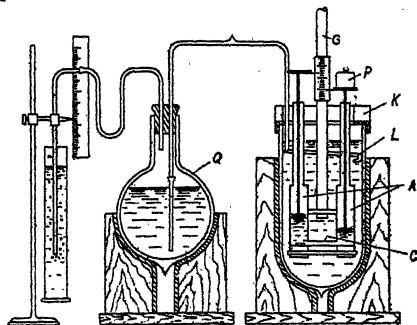


Fig. 3

Temperature is kept constant by a controlled air supply through pressure adjustment in Vessel Q, which serves as a container for liquid air, and is provided with a siphon. Where heat conservation is necessary tubing, etc., may be of hard paperboard or jacketed.

In moving the test material (oil or fat) by means of the loaded piston, the whole of the driving force is not applied in the capillary as frictional energy to the mass: a small part (a few per cent) is used up in the spaces between pistons and cylinder walls. In order to prevent entry of air to the test material, during the upward movement of the piston, a small additional load may be added to both pistons, so that, even with upward piston movement, a little of the oil or fat is always forced between piston and cylinder wall. The amount of oil so used is very small and does not affect the test results in any way.

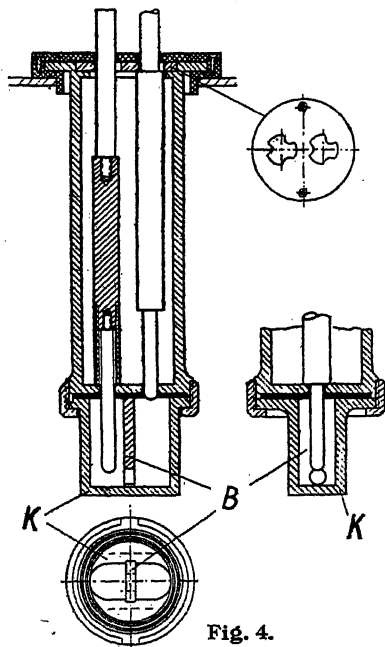


Fig. 4.

The apparatus was first tested with normal Newton liquids and the various factors evaluated, using the following expressions:

$$\eta = C \frac{P}{v} \quad (1); \quad v = \frac{h}{t} \left(\frac{\text{cm}}{\text{s}} \right) \quad (2) \quad v = \left(\frac{C}{\eta} \right) P \quad (3)$$

in which viscosity is η , in poises, v is movement of piston, P is kp or kilopond (1 kg-

force), h is piston track in cm., and C a constant determined by eight tests between temperatures 10° and 25°C ., t = time, and s = sec.

C was determined for normal oils at the temperature range stated, in which viscosity ranged from 65 to 6310 poises. If C is a constant then equation (3) must be valid for all values of η and in accordance with (1).

For the new model instrument, with three capillaries of varying diameters the following values for C were determined: (1) 3.5 mm. 2.68; (2) 6 mm. 23.3; and (3) 100 mm. 128. C was also evaluated from apparatus dimensions in accordance with the Hagen-Poiseuille law, whereby equation (1) was confirmed.

The limits for which this constant is valid were determined in connection with the following factors and experimental conditions: length of piston stroke, heat of friction, load limits, viscosity range of instrument (10^1 - 10^6 poises), temperature range, loss of liquid in cylinders or elsewhere, thermal inertia. Experimental error is from ± 1.2 per cent.

Tests were made with non-Newtonian or "structure-viscous" material, results of which are shown in a series of curves, showing the effect of load variation and test intervals, of temporary load reduction and increase, of small and large rest pauses at constant load, of reduced mechanical stress—by reducing the number of tests per time unit, continuous measurement with reduced stress (or load P). Temperatures in this series of experiments were -21 - 24°C ., and load was in most cases 2 kp except where otherwise stated.

In the curves, variation in apparent viscosity $\eta = C (P/v)$ is shown as log. mean ordinates).

In Fig. 4 is shown a further development of the method and apparatus for materials of still greater viscosity; if flow resistance is further reduced, the driving pressure increased, and measurement scale more finely graded. Instead of the two cylinders, an elongated metal container K with screw top and base is used. This is completely filled with the test material.

Instead of the capillary as flow resistance a reversible baffle or diaphragm B is included, of which the opening can, if required, be made very large.

In steady operation of the instrument a pressure of several atmospheres may be applied with suitable load, with or without lever transmission—as compared with about 1 atmosphere shown in Fig. 1.

By suitable adjustment of flow resistance by baffle B viscosities up to 10^6 poises may be measured, or even up to 10^{10} by using microscopic readings.

THE TRAINING OF A CHEMIST

Increasing Complexity of Academic and Industrial Needs

by PROF. T. S. WHEELER, D.Sc., Ph.D., F.R.I.C.

PROF. T. S. WHEELER, who was recently re-elected president of the Irish Chemical Association, delivered his presidential address, on October 20, before a meeting of the association held in the Department of Chemistry, Trinity College, Dublin. His subject was "The Training of a Chemist." Before his address, Prof. Wheeler reminded his hearers that in the near future it was planned to transform the association into the Irish Institute of Chemistry.

In his address, Prof. Wheeler said he regarded the subject as of fundamental importance, because a body like their association must have always in mind the future of the profession and strive for a continuous improvement in the training of chemists. Before considering in detail the form and scope of this training, Prof. Wheeler said he thought it well to examine one or two aspects which added to the complexity of the problem.

In the first place there was the frightening continuous increase in the scope of their science. As he thought back 30 years to his student days, when the atom as far as the chemist was concerned had no internal structure, physical chemistry had a strictly limited content requiring little mathematics, and stereo chemistry was still simple, he could not but feel sorry for the modern student with so much additional matter to assimilate.

"Apart from the difficulty of subject matter," said Prof. Wheeler, "we teachers confront the fact that chemistry is extensively practised both on the pure and applied sides. In this connection we are between the natural sciences—botany for example—of which the application is not yet highly developed, and medicine. I say this with no intention of criticism, where we people on the side-lines sometimes think the practice swamps the science."

The Three Stages

The training of a chemist, continued the professor, could obviously be divided into three stages—school, undergraduate, and post-graduate. When he was at school there was a regrettable tendency to specialisation; one had to decide for or against mathematics and science or languages at 13 or 14. Opinion had now rightly swung the other way, and emphasis was laid on the necessity for a sound general education at school with no great emphasis on the special

subject to be studied at the university. Thus, in the report of the Chemistry Education Advisory Board of the Royal Institute of Chemistry, emphasis was laid on the necessity for students of chemistry to receive a wide basis of general culture on which to build their intellectual life.

"It is considered that at least one-third of the school time should be allotted to the study of languages, history and other subjects of general interest," said Prof. Wheeler. "I think we should all like the future chemist on entering the university to be able to read French and German, have some facility in mathematics, and a general acquaintance with science and the scientific method. Above all, the student should be able to express himself clearly and grammatically. In America, Britain and Eire there seems to be general agreement that the more the chemist knows the less he can explain.

English Neglected

"My own experience with students—I may, of course, have been unlucky—is that in general they appear to have no training in the simple rules which lie at the base of English style. Further, students do not seem to be taught the necessity for revising and polishing what they have written."

One of the principal tasks of the university teacher of chemistry was how to isolate from the immense mass of material available what should be put to the student in his undergraduate course. It was now generally accepted that it was impossible adequately to train a student to the standard of an honours degree in less than four years. How best to do this and to supply also the necessary knowledge of ancillary subjects, such as physics and mathematics, was a question to which he could supply no certain answer, said the Professor. He thought they all agreed that there must be increasing specialisation as the course progressed and that the final year must be devoted solely to chemistry.

At present in University College, Dublin, a student took in the first year four, and in the second and third year three, subjects. There were many other possibilities open to discussion; in the third year, for example, a student might restrict himself to two subjects, chemistry as a major and physics, mathematics or botany as a minor subject.

Both types had their adherents. Those who feared over-specialisation preferred

the first; others who wished to bring a student as far as possible at the university suggested the second. He had seen both tried and was left with an open mind; the average student was as adaptable as the average baby and triumphantly survived a variety of intellectual diets.

Taking the three subjects for two years as a basis for discussion, Prof. Wheeler said on this system a student who intended to proceed to an honours degree in chemistry took chemistry, physics, mathematics and botany, or mathematical physics; in his second and third years he took three subjects—botany, chemistry and physics or chemistry, mathematics and physics. At the end of the third year the student sat a general degree examination in three subjects, and if he passed this examination and did well in chemistry he was admitted to the honours school.

The General Course

Dealing with the content of the general course in chemistry, the professor said in the first year it was usual to give a general survey of inorganic and general chemistry. This was, he thought, necessary so that students might obtain an idea of the scope of the subject, but it led to a certain amount of repetition in the second year.

Further, the professor's experience had been that the average student found the present method of presenting chemical philosophy difficult to follow. He learned a number of elaborately worded laws of which he only vaguely understood the implications. When to this was added the complication of Avogadro's hypothesis, he floundered, or at least he (the professor) did, for it was six months before he glimpsed what it was all about. He hoped, therefore, as an experiment to introduce the student to the atomic theory and then show how the facts fit, rather than present the facts and deduce the theory from them.

As regards practical work, the professor said he thought the time had come for qualitative analysis in the first year to be carried out by micromethods. In the second and third years, the time of the student was equally divided among his three subjects, which meant that in chemistry he would have four lectures and two afternoons' practical work per week. In the second year these lectures might be divided equally between physical and organic chemistry, and in the third year between inorganic and organic chemistry. The study of physical chemistry before inorganic chemistry might seem odd but it made certain that a student before he began the systematic study of inorganic chemistry had the necessary knowledge of atomic structures.

It was said, of course, not feasible for the student in the time available to learn enough chemistry to permit his being regarded as a professional chemist, went on Prof. Wheeler. He was equally entitled to be considered as a professional mathematician, a physicist or botanist, according to the other subjects he took for a degree. The primary object of the three-years' course was to impart a general knowledge of science which would be of use to a teacher or would serve as a foundation for specialised knowledge.

His experience with the type of general course which he outlined was that the students who specialised in chemistry received generally a knowledge of their subsidiary subjects sufficient to enable them to deal with a fourth year in chemistry. Chemistry itself was the chief difficulty. Two lectures a week for two years were sufficient for organic chemistry; the students received a course covering the general aliphatic and aromatic chemistry, together with lectures on the structure of some of the more important classes of compounds—terpenes and carbohydrates would serve as an example. In organic chemistry, too, when this was presented and the way opened to a discussion of the periodic table, it was possible to give an adequate survey of the subject.

Physical chemistry was, however, troublesome, said Prof. Wheeler. It was difficult in two lectures a week to give a sound course in what was now probably the most fundamental portion of the science of chemistry. As a result, some of the lecture time in the fourth year might have to be devoted to work less advanced than would normally fall to be done in the final year of an honours degree. That was why he had some sympathy with those who advocated in place of three, two subjects only, a major and a minor, in the third year.

Fourth Year

Considering the specialised work for the fourth year, the professor said there were two schools of thought. One held that a student should spend a portion of this year working on a research problem; others felt that it was better that his practical work should include an introduction to a variety of modern techniques—chromatography, high vacuum, distillation, absorptiometer working, and so on. At the moment he followed the second school mainly because students did research in their M.Sc. year.

It was usual, went on the professor, to divide the fourth year lectures into short courses on various themes of interest in modern chemistry. It was important, he felt, that at this stage students should receive instruction in quantum chemistry and on the structures of animal products, which

represented a main interest of organic chemists. A study of the chemistry of the sterols introduced the student to many interesting phases of stereochemistry and to a variety of complicated reactions.

In planning an honours course it had to be remembered that what was new at present might be in 20 years' time part of the stock-in-trade of the average chemist. When he was at college, isotopes were a novelty; (all chemists must now be familiar with the notion and the underlying theory). Similarly, 20 years after Schrodinger's classical work on quantum mechanics, they were only now learning how to teach it to chemists using simple mathematical methods; in 10 years it might be a part of all chemistry courses, and in 20 years there would be few chemists without some understanding of the subject. Advanced students must, therefore, receive lectures on what appeared to be subjects of little importance to present day technical chemists.

They had now the fully trained chemist ready to begin his career, said the professor. There remained, however, the M.Sc. degree. A practical reason for taking that was that a man with an honours B.Sc. might be considered by an employer inferior to one with a pass degree holding the M.Sc. Further, a training in research methods was always valuable. On that account, an honours student might well decide to stay on for the M.Sc. and even the Ph.D. degrees. This meant that fully to qualify himself a student would have to spend seven or more years at college—a long time, but it took as long to train a medical doctor, and there was no reason why the training of a chemist could be performed more quickly.

Honours Students

What, then, did they hope to have achieved when they finished with their honours student? asked the professor. They might, he thought, expect them to have a good manipulative technique and a general knowledge of chemistry in all its branches. They should know where to look for such special knowledge as they needed in connection with the problems they encountered. They should also have learned to think scientifically, to form their opinions on the facts, and devise these opinions if additional facts made it necessary. Further they (the honours students) should be tolerant of the opinions of others and always remember that they were as likely to be wrong as those with whom they differed. They should have come to realise that they were members of an ancient profession to which belonged and had belonged many great men and that they should always bear themselves accordingly.

So far, said the professor, he had been dealing with the training of a chemist as ordinarily understood. This training, however, was purely academic, so that for years there had been complaints from industrialists that an academically trained man without much other experience was of little use to them. It was, they said, as if a doctor went into practice without hospital experience of any kind. There was much discussion of this sort after the first world war during which there had been a sudden and urgent demand for factory chemists, and when academically-trained men were, it was stated, in many instances found wanting.

Technical Training

The question how far a university should attempt technical training bristled with difficulties. The professor thought, however, that it was perhaps unfair to expect a small employer who had one or two chemists to teach them their industrial technique at his own expense. Further, his general experience during the last three years had been that Ph.D.'s and men with first class honours seemed to settle down less readily in industry than second honours and pass men.

Generally, and he regretted to have to say it, in industrial organisations in which he had had experience, the engineers seemed to fit in better and to be of more immediate value than the chemists.

In recent years, many universities had made provision for teaching applied chemistry, and some years before the war, his predecessor, the late Prof. T. J. Nolan, and Prof. M. J. Hogan, Professor of Mechanical Engineering in the College, planned a course in chemical technology to be taught in University College, Dublin. The war prevented the starting of the course. It had now, however, become possible to provide facilities for teaching it, and this session would see it in operation for the first time. As a tribute to the memory of Prof. Nolan, whose efforts made this course possible, it was proposed to call their new technical laboratory the Nolan laboratory.

They regarded it as essential that technical chemistry should not be studied until the student had had a good grounding in the fundamentals of the science, went on the professor. Accordingly, those students who passed the General Science examination, and who were not attracted to further academic studies, could apply for admission to the new course. The curriculum provided for a training in the fundamentals of engineering drawing and lectures on unit operations. There would be lectures also on fuel and its utilisation and on such elementary engineering as would be useful to a chemist who was expected to run all departments of a small factory.

Electron Microscopic Studies

Aid to I.C.I. Paint Research

IN its continuous research for improved paints, the Paints Division of I.C.I., Ltd., has installed an electron microscope capable of a total magnification as high as 50,000 times—that is 25 times greater than the ordinary microscope. This will be of considerable help towards solving some of the problems that confront the paint manufacturer in meeting the complex requirements of his customers. One of these problems is to provide a perfectly opaque surface with lasting gloss. At first sight this may not seem very difficult, but some idea of the extent of the problem can be gauged from the magnified photograph of zinc oxide pigment reproduced which reveals the strangely shaped particles, their gritty appearance, and sharp edges. A cluster of such particles may cause in a finish minute irregularities which break up the reflecting surface, and cause poor gloss.

In addition to their effect upon the smoothness of a painted surface, the shapes and sizes of pigment particles, and the efficiency with which they are incorporated into the paint, also have a marked influence on uniformity of colour and ease of brushing.

Many of the commonly used pigments contain particles so small that they cannot be detected under the ordinary microscope, and knowledge of their shapes was limited. Under the electron microscope, a trial finished paint surface may be examined, and the first signs of surface faults detected long before they become apparent to the naked eye.

It is interesting to note how close is the parallel, in different media, between the electron microscope and the ordinary optical microscope. The main differences are that the specimen is "illuminated" by a beam of swiftly moving electrons instead of light, and that glass lenses are replaced by specially shaped magnetic fields. The electrons serve a purpose similar to light, and the magnetic fields—or magnetic electron lenses, as they are called—act on the moving electrons in much the same way as glass lenses act on light.

Mr. J. Davidson Pratt

THE CHEMICAL AGE hastens to tender its apologies to Mr. J. Davidson Pratt, director of the Association of British Chemical Manufacturers, and to Sir Frederick Bain for the inadvertent substitution last week of the latter's name in the caption of the picture showing Mr. Davidson Pratt, accompanied by the President of the Board of Trade (Mr. Harold Wilson), at the annual dinner of the ABCM (*THE CHEMICAL AGE*, October 23, page 550).

More Barium Chloride

New Plant Will Relieve Acute Shortage

THE prolonged shortage of home produced barium chloride which has been a source of embarrassment to chemical, paint and some other industries is likely soon to be relieved. This is the effect of a statement issued this week by Laporte Chemicals, Ltd., of Luton. The company, which has been intimately concerned for a number of years with the production of a variety of other barium compounds, states that the erection of a plant for the manufacture of barium chloride at the Barnsley works of its subsidiary, John Nicholson & Sons, Ltd., is well advanced and production is expected to begin at the end of November.

It is stated that this plant will be large enough to meet the home trade requirements and it is hoped to have a supply available for the export market.

In the first instance, the product will be made in the crystal form, but subsequently an anhydrous quality will be produced.

The scarcity of barium chloride, which has enforced greatly increased dependence on Continental supplies at inflated prices, dates approximately from the closing down at the beginning of this year of this department of the Athole G. Allen Company for reasons which were fully explained at the time by the chairman of the company (*THE CHEMICAL AGE*, February 14, 1948). There is ample evidence that mineral barytes in various parts of the country are sufficient to supply all foreseeable needs.

ALLOCATION OF ISOTOPES

A COMMITTEE to decide priorities in allocating radioactive and stable isotopes has been set up under the chairmanship of Sir John D. Cockroft, director of the atomic energy research establishment at Harwell, Berkshire. The committee include representatives of the Medical Research Council, the Agricultural Research Council and the Department of Scientific and Industrial Research, representing universities and industrial interests.

Announcing this on October 24, the Ministry stated that while isotopes are scarce, the committee will decide questions of allocation to research workers in science and industry in accordance with the urgency of the investigation and the facilities available for its conduct. "GLEEP," the low-energy pile at Harwell, is already providing limited quantities of radioactive isotopes and facilities for experimental workers, and arrangements have been made to buy American and Canadian radioactive isotopes to supplement these supplies until the large pile at Harwell is operating at full power.

Vermiculite in South Africa

Widening Scope of Domestic Chemistry and Industry

SPECIFICATIONS are being prepared for vermiculite and its products for submission to the South African Bureau of Standards in order to stabilise the quality throughout the Union. The establishment of a standard will overcome the difficulties of a number of manufacturers of vermiculite products in obtaining continuous supplies of vermiculite of specific quality. As an insulating material, the specific gravity is of great importance.

It is almost impossible to obtain a large quantity of exfoliated vermiculite in which all the bags contain the same material. Variations in density up to 25 per cent are common. This is due to uneven exfoliation through the raw material being fed into the furnaces without proper grading. Thus, when the heat and speed of the exfoliator are adjusted to deal with larger flakes the smaller ones burn and crumble to powder.

* * *

During the year to March 31, 1948, Gypsum Industries, Ltd., showed a profit of £15,988, as compared with £17,001 for the previous year. The dividend is maintained at four per cent. Capital expenditure on the Cape Town factory amounted to £105,087. It began operations only in July, 1948, so that the additional share capital of the company will now become productive. Supplies of gypsum from South African quarries have been satisfactory, and the position in regard to other materials has eased considerably.

* * *

Fertiliser factories in South Africa are operating at full capacity but deliveries of their products are being delayed by shortages of rail transport. The Union's allocation of nitrogen fertilisers will, as in past seasons, again fall short of the farming industry's full needs, but increased consignments of superphosphates are being received from Europe and it is expected that these will go far towards meeting the existing demand. Supplies of potash are reported to be sufficient to meet this season's demand but future importations give rise to feelings of uncertainty due to the disturbances in Palestine.

* * *

There has been a decrease in salt production in the Cape Peninsula because of excessive rains, according to an official of a firm owning salt pans in the Malmesbury district. During the past season, he said, salt production had dropped by one-third. Normally 40,000 bags of salt—the equivalent of 4,000 tons—were obtained in a season. An improvement is expected next year. Prieska, which provides much of the local salt needs,

also suffered from heavy rains earlier in the year, about 70,000 bags being lost. The pans of one firm, which produces 5000 tons a year, were "drowned" by the rains and no salt was produced. Two other pans normally yielding 8000 tons and 1200 tons a year, respectively, which were also affected by the rains, are expected to go into production again in October after having been closed for several months. Pans in the Britstown district are also expected to resume work in October.

* * *

Experiments conducted recently on Government experimental stations with wheat and maize have shown that by using 2,4-D, yields can be increased by as much as 25 per cent. Another indication of the power of the preparation is that it kills off the water hyacinth. Hitherto the eradication of this weed has been a gigantic task. All previous weed killers have contained poison and could not be used in water. Now, 2,4-D is used—a 0.1 per cent solution finishing off the hyacinths.

* * *

African Bitumen Emulsions (Pty.), Ltd., of Durban, and Road Emulsions (Pty.), of Johannesburg, have been amalgamated to form African Bitumen Emulsions (Pty.), Ltd., with the head office at 96 Point Road, Durban, and plants in Durban and Johannesburg.

* * *

A Rhodesian company, known as Asbestone, Ltd., Bulawayo, is to make asbestos cement and other products for roofing, piping, and pre-fabricated houses. The company has a capital of £100,000. The factory was opened recently by the Rhodesian Minister of Commerce and Industry. The value of this company to the reduction of housing costs is being stressed.

* * *

Rust preventatives of high quality have recently been developed by a firm of wool scourers in Durban. Lanolin is used as a base, this raw material being recovered as a by-product in wool scouring.

* * *

The Union obtains the bulk of its requirements of soda ash from Lake Magadi in Kenya. Consumption of soda ash in the Union has risen from approximately 7000 tons per annum in 1938 to 35,000 tons per annum in 1947, and as soda ash is scarce throughout the world the difficulty of obtaining adequate supplies for the Union's needs is evident. Local users have been receiving about 70 per cent of their needs.

Rubber Seed Oil

More Encouraging Reports from Ceylon

EXPERIMENTS conducted by Dr. A. Sundaralingam, the Ceylon Government's rubber technologist, confirm the opinion expressed by the Rubber Commission recently that there is a useful harvest to be derived from the collection and sale of rubber seeds for oil extraction, states a report received from our Correspondent in Ceylon. The oil extracted from rubber seeds may form a substitute source of linseed oil.

In the past these seeds have been regarded as a waste product, and the commercial possibilities of their collection and marketing were, in fact, the subject of a not very encouraging report (*THE CHEMICAL AGE*, September 25).

The rise in the price of linseed oil in March, 1947, was partly responsible for the Rubber Commission's recommendation that rubber seed collection might well be encouraged on small holdings. The sale of seed, in their opinion, would provide a welcome seasonal addition to the small holders' earnings, and it is hoped that the Government's rubber purchasing depots will assist by organising the marketing of the smallholders' crops.

Three tons of oil have already been extracted at the laboratory of the Government rubber technologist. A ton of this oil fetched about £150 in the market and, therefore, the extraction of oil on a large scale is regarded as a reasonable commercial proposition.

On a conservative estimate, the rubber seeds that fall each year in Ceylon contain between 10,000 and 12,000 tons of oil worth between Rs.10-12 million. The Government is at present paying 5 cents per lb. for rubber seed, and in the near future when the necessary plant for the extraction of oil on a large scale is erected, there is the prospect of 3000 tons of oil being made available for export in the first few years of production.

CEYLON SALT PRODUCTION

THE salt production in Hambantota, Ceylon, is a record for recent years, and there is every prospect of the island's yield overlapping the one million cwt. level of production. According to Mr. E. B. Thisserasinghe, the Salt Commissioner, this year's production has been sufficiently satisfactory to enable Ceylon to get all her requirements of salt from the local yield. The yield of salt this year is the first good one for about eight years; a yield of 600,000 cwt. annually is reckoned good.

Iranian Production Plan

Proposed New Chemical Factories

A REPORT on Iran, now published by the Export Promotion Department of the Board of Trade in its series "Overseas Economic Surveys," contains, in addition to the usual facts and figures on finance, foreign trade, agriculture, industry and transport, interesting particulars about the seven-year plan prepared by a mission of United States experts and submitted to the Iranian Government last year.

The mining section of the report states that coal production amounts to some 150,000 tons per annum, produced from small horizontal shaft mines operated on behalf of the State by the Industrial and Mining Bank. As regards other minerals, 1000 tons of copper, 600 tons of sulphur, 10,000 tons of red oxide and 500 tons of arsenic ore are mined annually, all in State-owned enterprises. Borax deposits are known to exist in four localities, one of these deposits being estimated to represent about 22,000 tons. Exploitation by private enterprise has been limited to home demands as the outbreak of war terminated negotiations for the export of borax to France.

A sodium carbonate plant, erected in Teheran during the war to meet Allied needs, has an annual output of about 1000 tons. A proposal has been made to establish an iron smelting works at Kerej to use locally mined ores.

The only cement factory in the country is situated at Teheran and produced about 35,000 tons during 1946, at a cost of approximately 170s. per ton. Machinery, which is mostly of German and Danish origin, deteriorated greatly during the war, but recent repairs to a section of the drum mixing plant should make it possible to increase production. This factory is to be enlarged.

New Oil Company

For the development of the chemical industry it is proposed to erect the following factories: a sulphuric acid unit with an output of 45,000 tons per annum; a sodium carbonate and bicarbonate plant with an output of 14,000 tons; ammonia and ammonia fertiliser plants with an output of 15,000 tons, and tanning factories with an output of 10,000 tons per annum.

To exploit Iran's very large resources of oil, it is proposed to form an Iranian Oil Company to prospect in all areas not yet covered by existing concessions. The directors of this enterprise are to be exclusively Iranians, but technical directors and specialists may be engaged from abroad.

The report contains a special chapter on the work of the Anglo-Iranian Oil Co., Ltd.

PERSONAL

MR. J. J. MURRAY, of Imperial Chemical Industries, Ltd., was elected senior vice-president at the annual meeting of the Cleveland Scientific and Technical Institution.

The Minister of Fuel and Power has appointed MR. A. H. A. WYNN to be director of the Safety in Mines research and testing stations at Sheffield and Buxton.

MR. DAVID FLATHER, of Maltby, near Doncaster, a director of W. T. Flather, Ltd., the Sheffield manufacturers of alloys and BD Steel bars, who was Master Cutler in 1926, left £68,077 (£59,646 net).

MR. J. KENNETH WEIR, C.B.E., managing director of G. & J. Weir (1947), Ltd., and a director of the National Bank of Scotland, Ltd., has been appointed a director of the Dunlop Rubber Co., Ltd.

MR. F. H. STEVENS, chairman of the Sheppey Glue & Chemical Works, Ltd., Horley, and Mrs. Stevens, celebrated their golden wedding on October 18. Mr. Stevens, who has completed over 60 years with the firm, has been chairman for the past 19 years.

Employers' representatives on the Council of the Anglo-American Council of Productivity are: (Federation of British Industries) SIR FREDERICK BAIN, MR. A. R. BAINES, SIR PETER BENNETT, SIR MAURICE DENNY; (British Employers' Confederation) SIR GREVILLE MACINNESS, MR. C. B. CLEGG, and SIR JOHN FORBES WATSON.

De La Rue Insulation, Ltd., announces that MR. S. P. JORDAN, the architect who has been in charge of the company's design section, has resigned to take up private practice, but will continue to serve as the company's design consultant in connection with its Formica and other laminated plastics.

SIR JOHN DUNCANSON has resigned from the commercial and technical directorship of the British Iron and Steel Federation. Sir John joined the Iron and Steel Control in 1939 at the beginning of World War II. He succeeded to the controllership in 1942, where he remained until he took up his position with the Federation. MR. EDWARD W. SENIOR, Master Cutler of Sheffield for 1948, succeeds Sir John as commercial director of the federation.

MR. LOUIS W. CABOT will arrive at Liverpool with a staff of American engineers in mid-November to initiate the establishment on Merseyside of the first U.S. factory scheduled for Britain under the Marshall Plan. Engineering and construction of the plant for the manufacture of carbon black will be by British concerns under the direction and advice of a staff of technicians from the American company.

The honorary degree of Doctor of Technical Sciences was conferred on three noted powder metallurgists at the First International Powder Metallurgy Conference in Graz. The awards were made to DR. P. SCHWARZKOPF (U.S.A.), formerly Metallwerk Plansee, Reutte, Tyrol, now editor of the Powder Metallurgy Bulletin; PROF. J. A. HEDVALL, Swedish pioneer on powder metallurgy, who lectured on "Surface Activity and Powder Metallurgy" at the congress, and DR. W. D. JONES (England) author of the first well-known text-book on powder metallurgy.

MR. J. C. MANN, who has retired from the board of Midland Tar Distillers, Ltd., began his career in the tar industry with The Gas Light & Coke Company in 1883, and after serving with Major & Company, Ltd., of Hull, and Robinson Brothers, Ltd., of West Bromwich, he became general works manager of Midland Tar Distillers, Ltd., in 1921, and held this position till 1938. He became a director in 1937. He is a familiar and popular figure in the industry, particularly in the technical field, and an active supporter of various scientific institutions, notably of the Society of Chemical Industry, which he joined in 1891.

PROF. M. L. E. OLIPHANT, Professor of Physics at Birmingham University since 1937, has been appointed director of post-graduate research in the school of physical sciences at the National University of Australia. Prof. Oliphant was born in Adelaide in 1901 and studied at the University of Adelaide and Trinity College, Cambridge. He became Messel Research Fellow of the Royal Society in 1931; Fellow and lecturer, St. John's College, 1934, and the following year was appointed assistant director of research, Cavendish Laboratory, Cambridge. The professor will take up his post when the university is established as a working body, possibly in 1951. Meanwhile, he will continue to advise on the establishment of a research school of physical sciences in Canberra.

Obituary

The death has occurred at Balmore, Dumbartonshire, of MR. WILLIAM SMITH PAIRMAN (62), chairman and managing director of the Lambhill Iron Works, Ltd., Glasgow, of which he was one of the founders, and chairman of the Scottish Structural Steelwork Association.

The death has occurred at Gourrock, Renfrewshire, of MR. ALEXANDER (ALASTAIR) STEWART, a director of Graig & Rose, Ltd., paint manufacturers, of Edinburgh and Glasgow. He was in charge of the firm's Glasgow branch and had served the company for 51 years, six years longer than the period served by his father, the late Mr. Donald Stewart.

DR. J. L. POLAK, who died in London last week, aged 64, was for some 13 years a director of Lever Brothers & Unilever, Ltd., and had been an advisory director since he retired at the end of 1946. He joined the Van den Bergh business in 1922, and enjoyed repute and esteem in Anglo-Dutch legal and business circles.

The death has taken place of SIR WILLIAM PETER RYLANDS, at Massey Hall, Thelwall, near Warrington, at the age of 80. He relinquished a legal career to become managing director of the family firm of Rylands Bros., Ltd., in 1898, and gradually extended the scope of the concern by adding heavy steel and coal to its interests. He held many important industrial appointments.

MR. CHARLES ALEXANDER HILL, whose death occurred last Saturday in London at the age of 74, had been chairman and managing director of British Drug Houses, Ltd., from its inception in 1909 until his retirement in 1943. He obtained the Pharmaceutical Society's "major" certificate in 1896, the Fellowship of the Institute of Chemistry in 1899, and the B.Sc.(London) in 1904. His father and grandfather were both pharmaceutical chemists. Early in his career Mr. C. A. Hill foresaw the advantages of forming a group of manufacturing chemists on a scale far beyond the resources of any firm then in existence, and succeeded in uniting five century-old concerns as British Drug Houses. This enabled him and his associates to bring about big advances in the production of fine chemicals, first developing the manufacture of pure organic substances used in medicine and, then, introducing here the manufacture of complex organic substances for use in analysis and research, and so helping to displace German manufacturers from the leading position they formerly occupied. Mr. C. A. Hill filled many public offices on phar-

maceutical, chemical, commercial and public bodies. He was Master of the Salters' Company, and was closely associated with the formation and development of the Salters' Institute of Industrial Chemistry.

The death of DR. SAMUEL E. SHEPPARD, in Rochester, U.S.A., recently, has deprived the world of one of the highest authorities on the chemistry of photography, writes a correspondent. Born in Kent in 1882, Dr. Sheppard graduated from University College, London, with first class honours in chemistry. His work in photography, which dated from his university days in the early 1900's and continued until his retirement from Eastman Kodak on January 1 this year, contributed much to present-day photographic knowledge. An early discovery by Dr. Sheppard and his co-workers was the effect of sulphur compounds in gelatin on the sensitising action of the gelatin on silver bromide. New means were then devised of standardising such emulsions and producing film of more nearly uniform quality. Another of Dr. Sheppard's achievements was the discovery of several compounds which increased the sensitivity of film in various parts of the spectrum, thus paving the way for the high-speed and panchromatic films of to-day.

Fatal Fire and Explosion

Police and experts from the North-West Forensic Laboratory, Preston, spent several hours on October 23 at Farnworth investigating the cause of a mysterious fire and explosion which killed two men employed at the Britannia Chemical Works of W. C. Smithies & Company, tar and oil distillers. One theory is that the clothing of one of the men became ignited from a fire beneath a still. An explosion followed as his blazing clothing ignited vapour in some cooling tanks and then in turn his mate's clothing was ignited by the flashback. Four 500 gallon boilers of tar and oil were involved in the fire, but extensive damage was prevented by Farnworth fire brigade, who called in Bolton and Radcliffe.

Diversion of Exports.—The Board of Trade states that it is occasionally asked by exporting firms whether goods may be delivered from the export quota to residents of the United Kingdom against payment from accounts in other parts of the sterling area. The board emphasises that such transactions are directly contrary to the national interest. They should not appear as exports in the returns made by industry to the Board of Trade, nor should they be recorded against export targets.

Home News Items

Silica Refractory Bricks.—The Treasury has made the Import Duties (Exemptions) (No. 2) Order, 1948, which exempts from general ad valorem duty silica refractory bricks. It came into operation on October 16.

Lithopone from Germany.—Leonard Baines & Co., Liverpool, has been appointed sole agent for the Sachtleben Company, German manufacturers of lithopone, and the Board of Trade has granted import licences against firm orders.

World Engineering Conference.—Consultative status has been granted by UNESCO to the British section of the World Engineering Conference, which thus becomes recognised as the means of international contact between engineers, and is entitled to work with and send representatives to UNESCO.

Need for Veterinary Research.—The principal livestock diseases are the cause of the nation losing each year 6 m. rations of meat, 200 m. gallons of milk and 1500 m. eggs. These figures were revealed when the Duke of Norfolk attended a luncheon in London to appeal for funds to support the work of the Animal Health Trust.

Paper Mill to Close?—Because of the declining demand for esparto papers overseas and difficulties in the home usage of paper, the Ellangowan paper mills, Milngavie, Glasgow, may be forced to close. Some 300 workers have been advised that their employment will finish at the end of this month. A company meeting will be held shortly to decide the future of the mill.

Lampblown Scientific Glassware.—The growing tendency of Government departments to regard the British Lampblown Scientific Glassware Manufacturers' Association as the channel of contact between the Government and the industry was referred to by the president, Mr. H. J. Poulten, at the association's annual dinner in London recently. Mr. A. W. Rundle, chairman of the British Laboratory Ware Association, stressed the need for co-operation.

Agricultural Research.—The vital importance of research to farmers and agricultural students was the main theme in the address of Mr. Arthur Woodburn, Secretary of State for Scotland, on Founder's Day when he opened the newly constructed laboratories at the Rowett Research Institute, near Aberdeen. The laboratories, he revealed, formed only part of a ten year scheme covering the whole field of agricultural research with full Government backing.

£1 Million for Newsprint.—Britain has this week been authorised by the Economic Co-operation Administration in Washington to purchase \$4 million (£1 million) worth of newsprint from Canada with Marshall aid funds.

Cotton Conference.—Nearly 1000 delegates from the cotton industry will attend the forthcoming conference at Harrogate organised by the Cotton Board. The President of the Board of Trade, Mr. Harold Wilson, and the Minister of Labour, Mr. George Isaacs, will be among the principal guests.

Directorate of Paint Materials.—The Board of Trade announces that the removal of the directorate from Grosvenor Gardens, London, S.W.1, to Horseferry House (Fourth Floor), Horseferry Road, London, S.W.1 (telephone VICTORIA 6800). The address of the Paint Industry Materials Allocation Office remains unchanged.

Highest 1948 Coal Output.—The total British output of deep-mined coal last week was the highest this year, but was still below the weekly average of 4,836,000 tons required to reach the 1948 target of 200 million tons. Comparative figures are: Last week 4,274,700 tons (4,044,300 tons deep-mined, 230,400 tons open-cast), previous week 4,239,100 tons (3,992,300 tons deep-mined, 246,800 tons open-cast).

MoS Project at Blackpool.—It was disclosed on October 20, two days after a visit to Blackpool by plane of Ministry of Supply officials, that the recent plan for the re-opening of Squires Gate factory as an atomic research station has been dropped. In its stead, the Ministry is said to be working on a plan, proposed only within the last few days, which would employ several thousands at Squires Gate. During the war Wellington bombers were built there, and at its peak the factory employed 8000.

River Pollution Fine.—An appeal against a conviction and a fine of £15 by the Pwllheli magistrates on a summons alleging pollution by liquid ammonia of the River Eroch was dismissed in the King's Bench Division on October 22. For the appellant, Mr. Basil W. Soane, it was stated that the chairman of the magistrates had been present at the meeting of the local Fishery Board at which the decision to prosecute was taken. Mr. Justice Goddard ruled that the magistrate was not disqualified from adjudicating in the particular circumstances. He quashed the orders which had been made against the appellant and one other for payment of costs.

Next Week's Events

MONDAY, NOVEMBER 1

Society of Chemical Industry (Yorkshire section) in conjunction with Leeds University Chemical Engineering Society, University, Leeds, 7 p.m. H. H. Goldthorpe, W. H. Hillier, C. Lamb, and A. S. C. Lawrence: "Problems Arising from the Disposal of Effluents Containing Synthetic Detergents." Discussion. SCI Food Group: Royal College of Science, Huxley Building, Exhibition Road, South Kensington, S.W.7, 2.15 p.m. and 5.15 p.m. Symposium on: "Aspects of Packaging with Particular Reference to the Food Industry."

The Chemical Society (Oxford) Alembic Club lecture, Physical Chemistry Laboratory, South Parks Road, 8.15 p.m. Dr. W. F. Short: "Some New Methods for the Preparation of Amidines."

Royal Institute of Chemistry (Birmingham University Chemical Society). University, Edgbaston, 4.30 p.m. D. L. F. Wiggins: "Recent Advances in the Chemistry of Simple Carbohydrates."

TUESDAY, NOVEMBER 2

The Chemical Society (Eire). University College, Dublin. Prof. H. J. Emeléus: "Production and Uses of Radioactive Tracers."

Electrodepositors' Technical Society. James Watt Memorial Institute, Great Charles Street, Birmingham. P. Berger: "Barrel Plating and Barrel Finishing."

Institute of Metals (South Wales local section). University College, Singleton Park, Swansea, 6.30 p.m. Ivor Jenkins: "Controlled Atmosphere in Non-Ferrous Metallurgy."

WEDNESDAY, NOVEMBER 3

British Association of Chemists, Gas Industry House, 1 Grosvenor Place, London, S.W.1. 7 p.m. N. J. Megson: "Recent Advances in Thermosetting Resins."

Royal Institute of Chemistry (Society of Chemical Industry), University, Edmund Street, Birmingham, 6.30 p.m. Dr. W. G. Overend: "A Chemical Approach to Cytology"; Dr. M. Webb: "The Chemistry of Bacterial Cell Division"; A. S. Johnson: "Estimation of Water in an Industrial Laboratory."

Manchester Federation of Scientific Societies. Institute of Welding, Reynolds Hall, College of Technology, Manchester, 7 p.m. Edwin Davis: "Brazing of Ferrous and Non-Ferrous Metals."

Manchester Metallurgical Society. Engineers' Club, Manchester, 6.30 p.m. N. P. Allen: "Recent Developments at the National Physical Laboratory."

Paper Makers' Association, Engineers' Club, Manchester, 7 p.m. G. G. Taylor: "Colour Measurement."

THURSDAY, NOVEMBER 4

The Chemical Society (Sheffield). Chemistry department of the University, 5.30 p.m. Prof. W. T. Astbury: "The Electron Microscope and some Recent Discoveries with it in the Field of Macromolecules."

Institute of Metals (Leeds Metallurgical Society), Chemistry Department, University, Leeds, 7 p.m. Dr. R. Genders: "Wartime Metallurgical Developments in Great Britain."

Textile Institute (Yorkshire section), Technical College, Keighley, 7 p.m. R. J. Steele: "The Mystery of Colour."

Royal Institute of Chemistry (Liverpool), 7 p.m. Dr. W. H. Grace: "Some Aspects of Forensic Science."

FRIDAY, NOVEMBER 5

Sir John Cass Technical Institute (Department of Chemistry), Jewry Street, Aldgate, E.C.3, 6 p.m. G. Speight: "Stainless and other Special Steels."

The Chemical Society (Newcastle and Durham). King's College, Newcastle-on-Tyne, 5 p.m. Reading of original papers.

Society of Dyers and Colourists (Midland section), Feld's Cafe, Westgate, Huddersfield, 7.30 p.m. Section dinner: Visit of the President.

SATURDAY, NOVEMBER 6

Institution of Chemical Engineers (N.W. branch). Joint meeting with Chemical Engineering Group (Manchester), College of Technology, Manchester, 3 p.m. J. Leyland: "The Cooling of Circulatory Water for Coolers and Condensers."

Atomic Scientists' Conference

The Atomic Scientists' Association is holding to-day (Saturday) its annual conference at the Beaver Hall, Garlick Hill, E.C.4. There will be two sessions, from 2.30 to 5 p.m., and from 7 p.m. to 9.30 p.m.

The first session is concerned with atomic energy and society, and speakers will include Prof. Blackett on atomic weapons, Sir George Thomson on international control, Prof. Mott on national policy, and Prof. Pryce on the constructive applications of atomic energy. In the evening, speakers will include Sir Henry Dale, Prof. Peierls and Prof. Oliphant on the position of the scientists with regard to atomic energy and related problems.

Overseas News Items

Carbon Black Furnace Lining.—The Lone Star Steel Company's blast furnaces at Dallas, Texas, have been fitted out with linings of carbon black, which is reported to improve efficiency. The plant's production of foundry iron is said already to have exceeded the rated capacity of 970 tons gross per day.

South Africa to End Fertiliser Control.—Control of superphosphate supplies in South Africa is expected to end next year when new factories come into production. Total output, is then expected to reach about 500,000 tons a year, which should be sufficient to meet demands. Nitrogenous fertilisers, however, are likely to remain in short supply.

Belgian Dyestuffs.—The dyestuffs department of the Belgian Terte group has recently been reorganised and it is reported that about one-ninth of its total output is exported, chiefly to the Balkans, Latin America, Scandinavia, India and China. It is believed that the group has captured a substantial share of the former German market in dyestuffs.

Swiss Chemical Society.—The 60th annual meeting of the Swiss Society for Analytical and Applied Chemistry was held recently at Sion, with the president, Dr. R. Viollier (Basle), in the chair. Over 100 members and nine foreign delegates attended. The two main papers were: "Analytical Methods in the Research with Inactive Isotopes," read by Prof. K. Cusius (Zurich), and "Toxicological Research on Mercury," read by Prof. E. Cherbutier (Geneva).

New U.S. Sugar Refining Process.—The cost of refining sugar may be greatly reduced by a new process discovered in the U.S.A., it is claimed in a report by Dr. Donald F. Othmer, head of the department of chemical engineering in the Polytechnic Institute of Brooklyn, New York, who states that the discovery represents one of the few major new methods for refining sugar since bone char and other char were developed 100 years ago.

Cinnamon Stocks in Ceylon.—More than 42 million lb. of cinnamon are reported to be lying idle in Ceylon, where stocks continue to pile up in the absence of buyers. Only 16,500 bales of cinnamon have been sold from Ceylon during the seven months January to July this year (one bale of cinnamon is equivalent to 100 lb.). Producers have appealed to the Government for freer trading facilities so that they can export to any country without having to apply for licences.

Bauxite from British Guiana.—Exports of bauxite *via* Demerara increased from some 619,500 tons in the first seven months of 1947 to approximately 1,088,800 tons for the same period this year.

Cement Production in Southern Rhodesia.—A new £600,000 plant capable of producing 100,000 tons of cement a year will start operating in Southern Rhodesia next month. Maximum output is not expected to be achieved before April or May, 1949.

Dutch Iron and Steel Production.—The Koninklijke Nederlands Hoogovens en Staalfabrieken N.V., leading iron and steel works of the Netherlands, in its report for the year 1947-1948, revealed considerably increased output mainly due to works reconstruction.

New U.S. Credit for Brazilian Iron.—Stated to be the largest Brazilian mining and iron ore company, the Cia. Vale do Rio Doce, has recently been granted a further credit from the Washington Export-Import Bank, aggregating about \$7,500,000 at $3\frac{1}{2}$ per cent. The money is to be used for improvements to the railways linking the mines with the port of Victoria as well as for the purchase of mining equipment.

Italian Industries for S. Africa?—The African-Italian Financial and Industrial Corporation, a joint South African and Italian venture, with a capital of £1 m., is stated to be planning the transfer of existing Italian enterprises to South Africa. For example, a large alcohol distillery is to be erected near Natal, and plans are in hand for an iron and steel plant and a ceramic factory.

Scandinavian Chemical Co-operation.—Three Scandinavian chemical companies, the Danish Sadolin & Holmblad A/S, Swedish Upsala Ekeby A/B, and Norwegian Norsk Sprængstofindustri A/S, have formed a joint company to erect a phthalic anhydride plant near Copenhagen. The new plant, which it is anticipated will be completed by 1950, may be sufficient to supply all the Scandinavian countries.

Exploitation of Jura Oil Shales.—Bituminous oil shale deposits known to exist in the Swiss Jura, more particularly between Courtemantruy and Assuel where the average oil content is estimated to be $4\frac{1}{2}$ per cent, are to be utilised for the manufacture of special building material. The advice and co-operation of Sweden is being sought, as a method has already been developed of making satisfactory building materials from Swedish oil shale residues.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ADVANCED ANODISING AND PLATING CO., LTD., London, N. (M., 30/10/48.) September 21, debenture to Barclays Bank Ltd., securing all moneys due or to become due to the Bank: general charge.

BRITISH PLASTOIDS CO., LTD., Barrow-on-Soar. (M., 30/10/48.) September 24, £1000 further charge, to C. R. B. Eddowes, Derby; charged on Southfield, Barrow-on-Soar. *£1200. November 15, 1945.

LAFARGE ALUMINOUS CEMENT CO., LTD., London, W. (M., 30/10/48.) September 30, £25,000 4 per cent first debenture stock, part of amount already registered. *£35,000. October 9, 1947.

PEEL LABORATORIES, LTD., London, N. (M., 30/10/48.) September 22, £800 debentures, part of a series already registered. *£500. January 12, 1948.

SANT STURGESS, LTD., London, N.W. (M., 30/10/48.) September 22, £50,000 charge to Universal Estates Ltd.; charged on 1 Gorst Road and 7 Sunbeam Road, Chase Estate, N.W.10. *£27,500. March 23, 1948.

SOLARTRON LABORATORY INSTRUMENTS, LTD., Kingston-on-Thames. (M., 30/10/48.) September 20, series of £1000 debentures, present issue £730; general charge.

WESTERN OXIDE & PAINT CO., LTD., Plymouth. (M., 30/10/48.) September 17, mortgage to Halifax Building Society securing £3450 and further advances; charged on Commercial Yard, Sutton Road, Plymouth.

Satisfactions

BRITISH ALUMINIUM CO., LTD., London, E.C. (M.S., 30/10/48.) Satisfaction September 17, of Trust Deed registered September 17, 1934.

NORTH BRITISH ALUMINIUM CO., LTD., London, E.C. (M.S., 30/10/48.) Satisfaction September 17, of Trust Deed registered September 17, 1934.

FLASPEX ENGINEERING CO., LTD., Linslade. (M.S., 30/10/48.) Satisfaction September 24, of charge registered June 13, 1946, to the

extent of £2000 (land and premises being part of the premises known as 22 Mentmore Road, Linslade, contained in a conveyance dated May 17, 1946, having been released from the charge).

REX PLASTICS, LTD., London, E.C. (M.S., 30/10/48.) Satisfaction September 22, of charge registered March 3, 1947.

JOHN TOWNROE & SONS, LTD., Sheffield. (M.S., 30/10/48.) Satisfaction September 22, £2000, registered July 23, 1947.

Company News

The nominal capital of **Tebu Trading Co., Ltd.**, 35 Queensgate, S.W.7, has been increased beyond the registered capital of £500 to £5000, in £1 ordinary shares.

The nominal capital of **Colloidal Chemists, Ltd.**, 35a Besborough Place, S.W.1, has been increased beyond the registered capital of £5000 to £8000, in £1 ordinary shares.

The nominal capital of **Evolite Plastics, Ltd.**, 325 Latimer Road, W.10, has been increased beyond the registered capital of £1000 to £6000.

New Companies Registered

Baroseal, Ltd. (460,233).—Private company. Capital £500. Manufacturers of adhesives. Subscribers: H. A. Crowe and N. R. A. Crowe. Reg. office: 18 Rex Place, South Street, W.1.

Biopharm Serum Laboratories, Ltd. (12,616).—Private company. Capital £2000. Subscribers: R. N. Eichholz, solicitor, Rebecca Mendelsohn, secretary, both of 46/7 London Wall, London, E.C.2.

R. T. Burley, Ltd. (460,261).—Private company. Capital £5000. Manufacturing chemists. Subscribers: M. R. Cowper, 5 Upper Belgrave Street, S.W.1, and E. Marshall, same address.

French & Scott, Ltd. (459,989).—Private company. Capital £100. Chemical engineers, makers of chemical plant and materials. Directors: F. G. French, P. Scott. Reg. office: 9 Little Portland Street, Regent Street, W.1.

Laboratory Equipment (London), Ltd. (459,813).—Private company. Capital £3000. Manufacturers of hospital, industrial, chemical, scientific, research and laboratory equipment. Subscribers: G. K. Ireland and L. Cork, solicitors, of 20 Copthall Avenue, E.C.2.

Mann & Company (Chemicals), Ltd. (460,136).—Private company. Capital £3000. Manufacturing chemists and drysalers, etc. Subscribers: K. L. Burton and A. L. Snell, 1 St. Andrews Hill, E.C.4.

Plaspacking Ltd. (459,916). — Private company. Capital £1200. Manufacturers of plastic containers and goods of all kinds. Directors: Sir G. Duveen, T. Allen, L. Dohn, M.B.E., S. Harvey and A. Krakauer. Reg. office: 28a Basinghall Street, E.C.2.

E. Tarrant Evans & Co., Ltd. (459,372). — Private company. Capital £12,000. To acquire the business carried on by E. T. Evans and E. B. Evans, at 57 Ophir Road, Bournemouth, as E. Tarrant Evans & Co., factors and merchants of glass substitute, protective solutions, and welding compounds and powders, etc. Directors: J. G. Halliday, H. G. Halliday and Mrs. M. L. Halliday, E. T. Evans and E. B. Evans. The three first named are permanent. Reg. office: Bourne Chambers, St. Peter's Road, Bournemouth.

Time Engineers, Ltd. (460,070). — Private company. Capital £2000. Manufacturers of apparatus, chemicals and compositions connected with refrigeration and cold storage, etc. Directors: E. A. James, H. H. Stafford, J. A. Kirk, W. E. Ramsden and W. J. H. James. Reg. office: 27 Castle Drive, Ilford, Essex.

Chemical and Allied Stocks and Shares

LATEST international news and uncertainty aroused by the form of the Government's Bill for steel nationalisation checked the better trend in the market which was developing as a result of the good impression created by over-subscription of the £100 million issue of new 3 per cent Electricity stock. The latter in initial business touched a premium of 7s. 6d. but gilt-edged stocks generally turned slightly easier and leading industrial shares also lost part of earlier gains.

Chemical shares were helped by the White Paper reference to the industry's plans for expansion over the next four or five years. Imperial Chemical touched 48s. before easing to 47s. 9d., and Albright & Wilson 5s. shares moved up to 30s. 3d. helped by the 10 per cent interim dividend. Monsanto Chemicals held their recent rise to 60s., Fisons were firm at 59s., with Amber Chemical 2s. shares at 9s. 6d., and Borax Consolidated kept their rise to 62s. The 4s. units of the Distillers Co. rose to 29s. attention being drawn in the market to the group's important chemical and kindred interests. British Glues & Chemicals 4s. ordinary have been steady at 19s. 9d. Elsewhere, Staveley have fluctuated around 90s. the market still taking the view that although part of the money arising from the

projected capital return on its holding in Doncaster Amalgamated Collieries will be used for further expansion of the chemical side of the Staveley business, there may also be a return of capital for Staveley shareholders later on. Laporte 5s. units were 20s. 6d.

British Oxygen have strengthened to 45s., British Aluminium kept steady at 47s. 6d., United Molasses were higher at 48s. 9d. British Benzol fluctuated around 95s. 6d. and, awaiting the annual report due shortly, Benzol and By-Products were steadier at 11s. 3d. Asphalt shares reacted on the Anglo-American Asphalt Co.'s statement, but later were inclined to rally. Shares of companies with plastics interests moved narrowly, British Industrial Plastics 2s. shares being 7s., Erinoid 10s., De La Rue 39s., and British Xylonite £5½. British Match were uncertain around 34s. awaiting the interim dividend announcement. Coalite & Chemical 2s. shares turned firmer at 4s. 3d., and Tintex Dyes 2s. shares 3s. 6d.

Iron and steel shares were still inclined to attract speculative support on the hope that the Steel Bill may propose compensation on an assets value basis and not on share values. The latter, it is pointed out, have been affected by the dividend limitation stipulation. Stewarts & Lloyds were good at 59s. 3d., with Dorman Long 34s. 3d., Guest Keen 49s., but United Steel (30s. 9d.) have attracted profit-taking following publication of the results, although they showed profits at a new high level owing to record output. Elsewhere, Tube Investments were £6½. John Brown have risen strongly to 34s. 6d. owing to the company's reported big steel project in Rhodesia. The millions of pounds to be spent on power stations over the next few years gave a fillip to electric equipment shares, G.E.C. strengthening to 88s. 3d., English Electric to 48s. 3d., and Associated Electrical to 75s. 6d. The new export targets helped textile shares, and Calico Printers, following the higher profits announced for the past year, moved up to 20s. 3d.

Babcock & Wilcox at 72s. 6d. held their recent rise. This is one of the big British companies which is regaining control of its Japanese subsidiary. Boots Drug at 56s. have moved up well. British Drug 5s. shares were 9s. 9d., Beechams 18s. 9d. and Sangers 31s. 3d. Glaxo Laboratories were £18½. Oils have been inclined to strengthen on the big dollar financing arranged for Caribbean Petroleum, a Shell-Royal-Dutch subsidiary. Trinidad Leaseholds were firm at 81s. 9d. awaiting the financial results, but Ultramar Oil declined further to 40s. Burmah Oil, on Glasgow buying, moved up to 71s. 3d.

Prices of British Chemical Products

STEADY trading conditions are again reported on the industrial chemicals market, with a persistent demand for most of what may be termed the routine items. Makers are experiencing a steady pressure for deliveries under contract commitments and a number of buyers are already interested in contract replacements. The general buying interest is fairly widespread and not confined to any particular consuming industry, although the need for textile chemicals and dyestuffs is more apparent owing to the relative scarcity of these raw materials. Export trade is well maintained and the volume of inquiry is certainly not less than in recent weeks. With regard to values, there have been no important changes in quotations other than the price adjustments for non-ferrous metal compounds, most of which have already been reported. Business on the coal-tar products market both for home and export remains steady, with no particular feature to record.

MANCHESTER.—From the point of view both of new inquiry and actual order-book additions fairly steady trading conditions have been reported on the Manchester market during the past week. Replacement buying by home users has been on steady lines and shippers have again been in the market in respect of overseas business. There has been an active movement of supplies of soda ash and other alkali products from the works

to the consuming end, and a good demand for the full range of potash chemicals available has been reported. There has been little change in the position of the fertiliser materials, buying interest in which is regarded as satisfactory for the time of the year. In the tar products section, steady pressure for supplies of most of the light and heavy materials continues.

GLASGOW.—In the Scottish chemical market busy conditions have continued during the past week, although there are indications that a decrease in the volume of business is to be expected, due to the fact that a number of firms engaged in light engineering are not fully employed. Supplies have been fairly well maintained. It has been noted, however, that a number of firms are stocking up heavily for the winter in case of a repetition of the conditions which prevailed in the winter of 1946/47, when deliveries to Scotland of chemicals from English works were badly delayed. In the export market there has been no change; the position remaining fairly satisfactory.

Price Changes

Rises: Carbon tetrachloride, copper chloride, copper nitrate, lactic acid, lead nitrate, lead acetate, red lead, white lead, zinc oxide.

Reductions: Copper carbonate.

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton, £64; 80% pure, 1 ton, £66; commercial glacial 1 ton £79; delivered buyers' premises in returnable barrels: £4 10s. per ton extra if packed and delivered in glass.

Acetic Anhydride.—Ton lots, d/d, 11½d. per lb.

Acetone.—Maximum prices per ton, 1/5 tons, £76 10s.; single drums, £77 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alcohol, Industrial Absolute.—50,000 gal. lots, d/d, 2s. 7½d. per proof gallon; 5000 gal. lots, d/d, 2s. 10½d. per proof gal.

Alum.—Loose lump, £17 per ton, f.o.r. **MANCHESTER:** £16 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. **MANCHESTER:** £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—**MANCHESTER:** £46 per ton d/d.

Ammonium Carbonate.—£48 per ton d/d in 5-cwt. casks. **MANCHESTER:** Powder, £50 d/d.

Ammonium Chloride.—Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £21 to £25 per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate.—**MANCHESTER:** £5 per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £78 and £76 10s. per ton.

Antimony Oxide.—£162 10s. per ton.

Antimony Sulphide.—Golden, d/d, as to quantity, etc., 4s. to 5s. per lb.

Arsenic.—Per ton, £40 5s. to £41 5s., according to quality, ex store.

Barium Carbonate.—Precip., d/d; 2-ton lots, £25 15s. per ton, bag packing, ex works.

Barium Chloride.—Currently imported at fluctuating rates.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £26 10s. per ton d/d; 2-ton lots, £26 15s. per ton.

- Bleaching Powder.**—Spot, 35/37%, £11 10s. per ton in casks.
- Borax.**—Per ton for ton lots, in free 1-cwt. bags, carriage paid: Commercial, granulated, £30; crystals, £31; powdered, £31 10s.; extra fine powder, £32 10s. B.P., crystals, £39; powdered, £39 10s.; extra fine, £40 10s. Borax glass, per ton in free 1-cwt. waterproof paper-lined bags, for home trade only, carriage paid: lump, £77; powdered, £78.
- Boric Acid.**—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granulated, £52; crystals, £53; powdered, £54; extra fine powder, £56. B.P., crystals, £61; powder, £62; extra fine, £64.
- Calcium Bisulphide.**—£6 10s. to £7 10s. per ton f.o.r. London.
- Calcium Chloride.**—70/72% solid, £8 12s. 6d. per ton, in 4 ton lots.
- Charcoal, Lump.**—£25 per ton, ex wharf. Granulated, £30 per ton.
- Chlorine, Liquid.**—£29 per ton, d/d in 16/17-cwt. drums (3-drum lots).
- Chrometan.**—Crystals, 5½d. per lb.
- Chromic Acid.**—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.
- Citric Acid.**—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6½d., other, 1s. 5.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.
- Cobalt Oxide.**—Black, delivered, 6s. 7d. per lb.
- Copper Carbonate.**—MANCHESTER: 1s. 7½d. per lb.
- Copper Chloride.**—(53 per cent), d/d, 1s. 10½d. per lb.
- Copper Oxide.**—Black, powdered, about 1s. 4½d. per lb.
- Copper Nitrate.**—(53 per cent), d/d, 1s. 8½d. per lb.
- Copper Sulphate.**—£42 10s. per ton f.o.b., less 2%, in 2-cwt. bags.
- Cream of Tartar.**—100%, per cwt., from 157s. per 1-2 cwt. lot, d/d.
- Ethyl Acetate.**—10 tons and upwards, d/d, £115 per ton.
- Formaldehyde.**—£31 per ton in casks, according to quantity, d/d. MANCHESTER: £32.
- Formic Acid.**—85%, £64 per ton for ton lots, carriage paid. 90%, £67 5s. per ton.
- Glycerine.**—Chemically pure, double distilled 1260 s.g., 123/1 per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.
- Hexamine.**—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.
- Hydrochloric Acid.**—Spot, 7s. 6d. to 8s. 9d. per carboy d/d, according to purity, strength and locality.
- Hydrofluoric Acid.**—59/60%, about 1s. to 1s. 2d. per lb.
- Hydrogen Peroxide.**—1s. 0½d. per lb. d/d, carboys extra and returnable.
- Iodine.**—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.
- Iron Sulphate.**—F.o.r. works, £3 15s. to £4 per ton.
- Lactic Acid.**—Pale, tech., £80 per ton; dark tech., £70 per ton ex works; barrels returnable.
- Lead Acetate.**—White, 125s. to 130s. per cwt., according to quantity.
- Lead Carbonate.**—British dry, ton lots, d/d, £116 10s. per ton.
- Lead Nitrate.**—About £125 per ton d/d in casks. MANCHESTER: £125.
- Lead, Red.**—Basic prices per ton: Genuine dry red lead, £127; orange lead, £131. Ground in oil: red, £149 10s., orange, £161 10s. Ready-mixed lead paint: red, £154; orange, £169 10s. (subject to increase of £1 10s. per ton).
- Lead, White.**—Dry English, in 8-cwt. casks, £136 per ton. Ground in oil, English, in 5-cwt. casks, £157 10s. per ton.
- Lime Acetate.**—Brown, ton lots, d/d, £18 to £20 per ton; grey, 80-82 per cent, ton lots, d/d, £22 to £25 per ton.
- Litharge.**—£103 10s. to £106 per ton.
- Lithium Carbonate.**—7s. 9d. per lb. net.
- Magnesite.**—Calcined, in bags, ex works, £18 5s.
- Magnesium Carbonate.**—Light, commercial, d/d, £70 per ton.
- Magnesium Chloride.**—Solid (ex wharf), £27 10s. per ton.
- Magnesium Oxide.**—Light, commercial, d/d, £160 per ton.
- Magnesium Sulphate.**—£12 to £14 per ton.
- Mercuric Chloride.**—Per lb., for 2-cwt. lots, 7s. 6d.; smaller quantities dearer.
- Mercurous Chloride.**—8s. to 9s. per lb., according to quantity.
- Mercury Sulphide, Red.**—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.
- Methanol.**—Pure synthetic, d/d, £28 to £38 per ton.
- Methylated Spirit.**—Industrial 66° O.P. 100 gals., 4s. 10d. per gal.; pyridinised 64° O.P. 100 gal., 4s. 11d. per gal.
- Nickel Sulphate.**—F.o.r. works, 3s. 4d. per lb.
- Nitric Acid.**—£24 to £26 per ton, ex works.
- Oxalic Acid.**—£128 to £133 per ton packed in free 5-cwt. casks.
- Paraffin Wax.**—Nominal.
- Phosphoric Acid.**—Technical (S.G. 1.500). ton lots, carriage paid, £61 per ton;

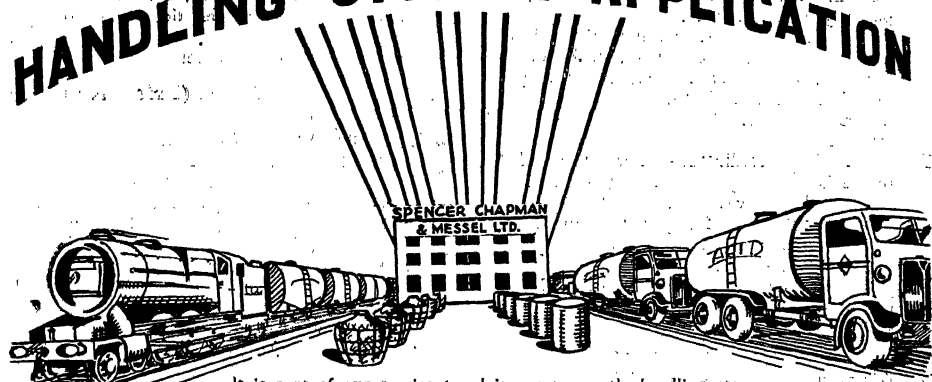
- B.P. (S.G.I.750), ton lots, carriage paid, 1s. 1d. per lb.
- Phosphorus.**—Red, 3s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.
- Potash, Caustic.**—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.
- Potassium Bichromate.**—Crystals and granular, 9½d. per lb.; ground, 10½d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.
- Potassium Carbonate.**—Calcined, 98/100%, £64 per ton for 1-ton lots, ex store; hydrated, £58 for 1-ton lots.
- Potassium Chlorate.**—Imported powder and crystals, nominal.
- Potassium Chloride.**—Industrial, 96 per cent, 6-ton lots, £16.10 per ton.
- Potassium Iodide.**—B.P., 8s. 8d. to 12s. per lb., according to quantity.
- Potassium Nitrate.**—Small granular crystals, 76s. per cwt. ex store, according to quantity.
- Potassium Permanganate.**—B.P., 1s. 8½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 8d. per lb.; technical, £7 14s. 3d. to £8 6s. 3d. per cwt., according to quantity d/d.
- Potassium Prussiate.**—Yellow, nominal.
- Salammoniac.**—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £21 to £25 per ton, in casks, ex store.
- Salicylic Acid.**—MANCHESTER: 1s. 11d. to 3s. 1d. per lb. d/d.
- Soda Ash.**—58° ex dépôt or d/d, London station, £7 12s. 6d. to £8 7s. 6d. per ton.
- Soda, Caustic.**—Solid 76/77%; spot, £18 4s. per ton d/d.
- Sodium Acetate.**—£41 per ton, ex wharf.
- Sodium Bicarbonate.**—Refined, spot, £11 per ton, in bags.
- Sodium Bichromate.**—Crystals, cake and powder, 8d. per lb.; anhydrous, 7½d. per lb., net, d/d U.K. in 7-8 cwt. casks.
- Sodium Bisulphite.**—Powder, 60/62%, £28 7s. 6d. per ton d/d in 2 ton lots for home trade.
- Sodium Carbonate Monohydrate.**—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.
- Sodium Chlorate.**—£45 to £47 per ton.
- Sodium Cyanide.**—100 per cent basis, 8d. to 9d. per lb.
- Sodium Fluoride.**—D/d, £4 10s. per cwt.
- Sodium Hyposulphite.**—Pea crystals 22s. 6d. per cwt. (2-ton lots); commercial, 1-ton lots, £16 per ton carriage paid. Packing free.
- Sodium Iodide.**—B.P., 10s. 2d. per lb. to 12s. 1d. according to quantity.
- Sodium Metaphosphate (Calgon).**—Flaked, loose in metal drums, £108 ton.
- Sodium Metasilicate.**—£19 5s. per ton, d/d U.K. in ton lots.
- Sodium Nitrate.**—Chilean Industrial, 97-98 per cent, 6-ton lots, d/d station, £19 15s. per ton.
- Sodium Nitrite.**—£28-29 per ton.
- Sodium Percarbonate.**—12½% available oxygen, £7 per cwt. in 1-cwt. drums.
- Sodium Phosphate.**—Di-sodium, £32 10s. per ton d/d for ton lots. Tri-sodium, £62 per ton d/d for ton lots.
- Sodium Prussiate.**—9d. to 9½d. per lb. ex store.
- Sodium Silicate.**—£6 to £11 per ton.
- Sodium Silicofluoride.**—Ex store, nominal.
- Sodium Sulphate (Glauber Salt).**—£8 per ton d/d.
- Sodium Sulphate (Salt Cake).**—Unground. £6 per ton d/d station in bulk. MANCHESTER: £6 5s. per ton d/d station.
- Sodium Sulphide.**—Solid, 60/62%, spot, £23 per ton, d/d, in drums; broken, £23 15s. per ton, d/d, in casks.
- Sodium Sulphite.**—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.
- Sulphur.**—Per ton for 4 tons or more, ground, £14 12s. 6d. to £16 17s. 6d., according to fineness.
- Sulphuric Acid.**—168° Tw., £6 10s. 2d. to £7 10s. 2d. per ton; 140° Tw., arsenic-free, £5 2s. 6d. per ton; 140° Tw., arsenious, £4 15s. per ton. Quotations naked at sellers' works.
- Tin Oxide.**—1-cwt. lots d/d £25 10s.
- Titanium Oxide.**—Comm., ton lots, d/d, (56 lb. bags), £97 per ton.
- Zinc Oxide.**—Maximum prices per ton for 2-ton lots, d/d; white seal, £90 5s.; green seal, £89 15s.; red seal, £87 15s.
- Zinc Sulphate.**—No quotation.

Rubber Chemicals

- Antimony Sulphide.**—Golden, 3s. to 4s. per lb. Crimson, 2s. 7½d. to 3s. per lb.
- Arsenic Sulphide.**—Yellow, 1s. 9d. per lb.
- Barytes.**—Best white bleached, £8 3s. 6d. per ton
- Cadmium Sulphide.**—6s. to 6s. 6d. per lb.
- Carbon Bisulphide.**—£37 to £41 per ton, according to quality, in free returnable drums.
- Carbon Black.**—6d. to 8d. per lb., according to packing.
- Carbon Tetrachloride.**—£56 to £59 per ton, according to quantity.
- Chromium Oxide.**—Green, 2s. per lb.
- India-rubber Substitutes.**—White, 10 5/16d. to 1s. 5½d. per lb.; dark, 10½d. to 1s. per lb.
- Lithopone.**—30%, £33 12s. 6d. per ton.
- Mineral Black.**—£7 10s. to £10 per ton.

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Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Phosphate.—Not quoted—temporarily unobtainable.
Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, in January, £10 5s., rising by 1s. 6d. per ton per month to March, 1948.
Calcium Cyanamide.—Nominal; supplies very scanty.
Concentrated Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. No. 1 grade, where available, £14 18s. 6d.
"Nitro-Chalk."—£10 4s. per ton in 6-ton lots, d/d farmer's nearest station.
Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £17 5s. per ton; granulated, over 98%, £16 per ton.

Coal-Tar Products

Benzol.—Per gal. ex works: 90's, 2s. 6d.; pure, 2s. 8½d.; nitration grade, 2s. 10½d.
Carbolic Acid.—Crystals, 11½d. per lb. Crude, 60's, 3s. 6d. to 4s. 3d. MANCHESTER: Crystals, 10½d. to 1s. 0½d. per lb., d/d; crude, 4s. 3d., naked, at works.
Crescote.—Home trade, 6½d. to 9½d. per gal., according to quality, f.o.r. maker's works. MANCHESTER: 6½d. to 9½d. per gal.
Cresylic Acid.—Pale, 97%, 3s. 6d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 4d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, 4s. 4d. per gal.
Naphtha.—Solvent, 90/160°, 2s. 10d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 4d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.
Naphthalene.—Crude, ton lots, in sellers' bags, £8 1s. to £12 13s. per ton according to m.p.; hot-pressed, £14 15s. to £15 14s. per ton, in bulk ex works; purified crystals, £28 to £43 5s. per ton. Controlled prices.
Pitch.—Medium, soft, home trade, 100s. per ton f.o.r. suppliers' works; export trade, £8 5s. to £9 5s. per ton f.o.b. suppliers' port. MANCHESTER: 100s. f.o.r.
Pyridine.—90/140°, 18s. per gal.; 90/160°, 14s. MANCHESTER: 17s. 6d. to 21s. per gal.
Toluol.—Pure, 3s. 2½d. per gal.; 90's, 2s. 4d. per gal. MANCHESTER: Pure, 3s. 2½d. per gal. naked.
Xylol.—For 1000-gal. lots, 3s. 3½d. to 3s. 6d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £15 per ton; grey, £22.
Methyl Acetone.—40/50%, £56 to £60 per ton.
Wood Creosote.—Unrefined, from 3s. 6d. per gal., according to boiling range.
Wood Naphtha.—Miscible, 4s. 6d. to 5s. 6d. per gal.; solvent, 5s. 6d. to 6s. 6d. per gal.
Wood Tar.—£6 to £10 per ton.

Intermediates and Dyes (Prices Nominal)

m-Cresol 98/100%.—Nominal.
o-Cresol 30/31° C.—Nominal.
p-Cresol 34/35° C.—Nominal.
Dichloraniline.—2s. 8½d. per lb.
Dinitrobenzene.—8½d. per lb.
Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.
p-Nitraniline.—2s. 5d. per lb.
Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.
Nitronaphthalene.—1s. 2d. per lb.; P.G. 1s. 0½d. per lb.
o-Toluidine.—1s. per lb., in 8/10-cwt. drums, drums extra.
p-Toluidine.—2s. 2d. per lb., in casks.
m-Xylidine Acetate.—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON: October 27 (for the period ending October 13 for refined oils). Per ton, naked, ex mill, works or refinery, and subject to additional charges according to package;
LINSEED OIL, crude, £200. **RAPESEED OIL**, crude, £190. **COCONUT OIL**, crude, £106 refined deodorised, £112 refined hardened deodorised, £116. **PALM KERNEL OIL**, crude, £105 10s., refined deodorised, £112; refined hardened deodorised, £116. **PALM OIL** (per ton c.i.f.), in returnable casks, £99 5s.; in drums on loan, £98 15s., in bulk, £97 15s. **GROUNDNUT OIL**, crude, £110 10s.; refined deodorised, £114, refined hardened deodorised, 40 deg. £118. **WHALE OIL**, refined hardened, 42 deg., £117; refined hardened, 46/48 deg., £118. **ACID OILS**, Groundnut, £94; soya, £92; coconut and palm-kernel, £97 10s. **ROSIN**: Wood, 30s. 6d. to 55s.; gum, 54s. to 60s. per cwt., ex store, according to grade. **TURPENTINE**, American, 74s. per cwt., Portuguese, 64s. per cwt. in drums or barrels, as imported (controlled price).

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Carbonisation and Chemicals

THE carbonising industries—coke ovens, gasworks, low temperature carbonisation—are the chief supports of our native organic chemical industry. The gases produced by carbonisation are used in a few places in this country and Europe for the production of chemicals. There is also the possibility of producing other chemicals by the development of ethylene recovery. In assessing these technical possibilities, due weight must now be given to the effect of nationalisation, not only on these industries but on those based on the products of carbonisation. Some assessment of future possibilities has been made in a recent paper to the Coke Oven Managers' Association, the Institute of Fuel and local district gas associations by Dr. G. E. Foxwell.*

The view has frequently been expressed that coke ovens should be developed principally as a chemical industry. The chances of using surplus gas for the manufacture of chemicals on a vast scale have been widely discussed. There appears to have been among chemists a disinclination to look with enthusiasm on the manufacture of fuel or power as a field for them. Dr. Foxwell has reminded the industries concerned that to-day the standard of living of any civilised nation depends on the amount of energy at the disposal of its population. "We can relate the wealth level of society directly to the availability of energy of the machines to manage this energy and of the know-how to operate

them," said an American industrialist. It is not altogether surprising, therefore, that an industry or group of industries which collectively process 40 million tons of coal in order to convert 100 therms of raw coal into 80 therms of saleable energy should be regarded primarily as an "energy" industry.

Those facts, however, must not obscure the chemical possibilities of the main or subsidiary products of coal. The chances here of economic large-scale production of oil from coal at the moment are small. The influence of jet-propulsion on the quality of oil may change this position, and the growing scarcity of oil could, of course, so increase oil values that production from coal would become economic. The chemist will also do well to remember that an ash-free suspension of coal in oil may serve as a fuel for future "gas" turbines. The possibilities of the Fischer-Tropsch process as a producer of organic chemicals from coal have probably not yet been fully explored, and there remains the possibility that future research will enable this process to be used as the basis for extensions of our organic chemical industry, the oil being a by-product.

Of the possibilities of the direct production of chemicals from coal the working-up of existing and potential by-product^c is the most practical development. Dr. Foxwell sees no reason to change existing practice in the tar and benzol industries, although there is, as he points out, the danger that the nationalised industries—coal and gas—which control the raw materials could

*"The Carbonisation Industries After Nationalisation" by Dr. G. E. Foxwell, D.Sc., F. Inst. F., M. Inst. Gas E. M.I. Chem. E., etc.—*The Gas World*.

On Other Pages

Leader:	
Carbonisation and Chemicals ...	607
Notes and Comments:	
Steel and Chemicals ...	609
The New Inquisition ...	609
Report on Streptomycin ...	609
Atomic Mindfulness ...	610
What, No Fireworks? ...	610
World Tin Pact ...	610
Technical Scholarships ...	610
More Oil Refining ...	611
New Powder Technology ...	611
Reduced Metal Subsidies ...	611
New £4 M. Oil Dock ...	611
British Pharmacopœia Launched ...	612
Synthetic Quartz Crystals from Powdered Silicon ...	612
Sulphuric Acid Production ...	613
Britain Supplies Latest Margarine Plant to Italy ...	613
The Assault on Scientific Freedom ...	614
The Role of Technology ...	614

Engineering Research ...	614
Safeguards in Industrial Chemistry ...	615
Wide Scope for Silicones ...	619
Polymeric Processes ...	620
Oxygen Technology ...	620
METALLURGICAL SECTION	
Iron and Steel Nationalisation ...	621
Growing Opposition in Scotland ...	622
Workers' Ballot Proposed ...	622
Electric Furnace Brazing ...	623
Solder is Still Indispensable ...	624
British Welding Prospects ...	625
Standardised Threads: Anglo-American Agreement Sought ...	626
Electrolytic Metal Polishing—III ...	627
Canadian Iron Ore Discovery ...	629
U.S. Metal Resources ...	629
Canada's Growing Steel Industry ...	629
Production and Stocks of N-F Metals ...	630
Castor Oil in Steel Casting ...	630
A Chemist's Bookshelf ...	632
New Light-Weight Concrete ...	634

withhold or divert supplies. That is an unpredictable risk, and the fact that such action would be unjustifiable does not render the contingency impossible.

Ammonia is in a situation different from that of tar and benzol. The bulk of ammonia is converted into fertilisers, the market for which is dominated by synthetic production. The relatively low prices secured for by-product ammonia make profitable production difficult. A body as large as the NCB or the Gas Council might well find that the large-scale production rendered possible by bulk operations will provide the means to make ammonia profitable once again. The proposal identified with the name of the late Percy Parrish is well worthy of re-consideration. That envisaged the setting up of central plants in each region to which could be sent highly concentrated ammonia liquor for working up into various products, not exclusively fertilisers or sulphate of ammonia. The chemistry of ammonia has not yet been fully exploited on the industrial scale and it is a fair prospect that ammonia itself can serve as the starting point for other chemicals.

The possibilities of ethylene have been widely explored, and there is no doubt whatever that among coal chemicals it has the greatest possibilities as a raw material for chemical production. Dr. Foxwell, while fully recognising these possibilities, calls to mind, however, the vast pro-

gramme of petroleum refining in this country and asks whether the carbonising industries have not "missed the boat." Already the petroleum industry is setting out to manufacture, largely from olefins, a wide variety of organic chemicals. As the market for these chemicals increases, the production of ethylene from coke ovens and even from gasworks may be found to be desirable.

There seem to be some doubts as to the economic desirability of producing ammonia or methanol from coke oven gas. It is exceedingly difficult to discover evidence of the price that can be paid for the gas. The price paid for coke oven gas for these purposes compares poorly with values as town gas.

The carbonising industries will continue to be a branch of the chemical industries, but it is evident that their future will be primarily that of fuel or energy-producing industries, at least for many years to come. The duties for consultation and co-operation that the various nationalisation Acts place upon them underline the anomaly that the Minister of Fuel and Power has neglected to place the NCB coke ovens and the gas industry under the control of the Gas Council. When one authority carbonises 10 million tons of coal and another 20 million tons and both supply coke and gas as their main product, not to put them both under one umbrella is inexplicable.

NOTES AND COMMENTS

Steel and Chemicals

THE presentation of the Iron and Steel Bill in the Commons, which according to present anticipations will take place on Monday, will signalise the attainment of a significant new phase in Government policy of monopoly control. While this measure is yet a Bill, and one fresh from the Parliamentary draftsmen, its purpose, if Government intentions are fulfilled next year, foreshadow changes in the conduct of industries more fundamental than its predecessors—coal, transport, gas and electricity. They by comparison were limited to specific industries and a few ancillaries traditionally within their sphere. If the projected Iron and Steel Corporation of Great Britain becomes a reality it will be obliged in directing its host of diverse subsidiaries to enter formidably into a dozen fields of productive industry in which Government participation and, inevitably, competition, have never before been seriously considered. Radio sets and tennis racquets have been mentioned as figuring among the incongruous interests which may now come within the scope of Government planning, for which this Bill is clearly intended to provide a foothold which could not fairly be won by direct attack. In that context it is now being prominently borne in mind that there are traditional bonds between chemicals and the iron and steel industry very much closer than those of the light engineering industries. (The Bill is reviewed on page 621.)

The New Inquisition

THE tightening stranglehold which international mistrust is applying to scientific exchange, and hence to the total rate of development, around the world is no novelty, but it sometimes appears that in liberal circles little is done except to deplore it. Many will accordingly have applauded the standpoint taken by Sir Henry Dale, past-president of the British Association, in his forthright presentation of the facts before the open meeting called last week-end by the Atomic Scientist's Association, at which the tendency apparent in some quarters to mistake the influence which has been responsible for most of the inter-

ruption of free communication was fairly well represented. The fact that some of the arguments in support of the latter viewpoint were supported by quotations from the Soviet Press did not add appreciably to their weight. In contrast, Sir Henry Dale's recognition that, since the suppression by another faith of the intellectual leadership of Galileo, there has been no greater threat to free minds than that now active in the U.S.S.R. was a statement of fact which nearly all ascertainable evidence confirms. He revealed, incidentally, that he continues to receive from Hungary, where the purge of scientists on political grounds continues unabated, pathetic letters from scholars who have been made its victims. These and the modern "Inquisition" which is operating in the Moscow Academy of Sciences cannot be ignored by anyone who aspires to pass judgment on the causes of the chasm which is widening between scientists of different nations.

Report on Streptomycin

AS news accumulates of steady expansion of streptomycin production it is easy to overlook how relatively new is the antibiotic and to what extent its use is still being determined by clinical experiment. The reminder comes from a report just released by the committee which the Medical Research Council appointed two years ago to study the effectiveness of streptomycin in the treatment of pulmonary tuberculosis. For those who are not medical practitioners, the outstanding fact of this report on the response of 55 victims of acute progressive tuberculosis of both lungs is that it was unmistakably successful by common standards. The 55, between 15 and 50 years old, in seven widely separated centres, received 2 g. of streptomycin daily by intramuscular injection; other parallel cases, acting as controls, received identical treatment without streptomycin. After six months, 14 of the control group had died, while of the "streptomycin" cases only four had ended fatally. Considerable improvement was observed in 27 (51 per cent) of the patients who received the drug and in only four (8 per cent) of those who did not. After a full year's observation 12 of those who had

been treated with streptomycin had died and of the control group 24. Rather less marked, however, was the contrast in physical improvement between the two groups, 31 per cent of the control group showing improvement, as compared with 56 per cent of the "streptomycin" cases. The report, which Dr. Marc Daniels prepared, contains much more of direct interest to those concerned with the production of streptomycin as well as to medical men. It records, for example, that the toxic effects of this treatment, which have sometimes been serious, were never so marked as to require abandoning the treatment. But it warns again that the antibiotic has not effected a "cure" in any of these cases, and the problem presented by the rapid engendering of streptomycin-resistant bacilli is as serious as ever.

Atomic Mindedness

TO be able to hold the unwavering attention of an extremely mixed audience and to explain lucidly in less than one hour the scientific achievement of atomic energy is a task which few other than Prof. M. E. L. Oliphant would venture to undertake. He is one of the few experts able to come down to the level of the layman. One of the remarkable things about his lecture, the first of the series on "The Atomic Age" given at the Memorial Hall, Farringdon Street, E.C., under the auspices of the Sir Halley Stewart Trust, was the extraordinarily mixed composition of the audience, proving the widespread interest being taken in this subject by the public. This "atomic mindedness" shows that many people besides scientists and chemists are deeply

concerned whether, as Prof. Oliphant said, radioactive energy is to be used by slow controlled release for the production of power to the benefit of mankind, or used violently, and catastrophically, in the form of the atom bomb.

What, No Fireworks?

IT is by now common, not to say disappointing, knowledge that for a week or two prior to Guy Fawkes' Day it has been next to impossible for John Citizen, senior or junior, to purchase any fireworks. Many retailers might have amplified their laconic: "Sold out!" or "We didn't get many this year," with the all too familiar explanation that a large proportion of fireworks have joined the "export only" category. The fact that the *feu de joie* on Friday evening was but a ragged discharge was for once not entirely the responsibility of the chemical industry. One of the principal makers of pyrotechnics explained to THE CHEMICAL AGE that output nowadays is limited largely by inadequate paper supplies. Actually, manufacturers get a bonus allocation of paper in proportion to the quantities of fireworks they export, on the principle of "No exports, no paper for your home trade." This year's fireworks were all produced without undue strain on the chemical constituents, but now, after the event, there are indications that one of the chief components is becoming increasingly hard to get. That refers to potassium nitrate, the shortage of which is not caused by any falling away of production, but by the increasing quantities of KNO₃ used in vitreous enamelling—for export and fittings of "pre-fabs." One of the principal suppliers has, in fact, instituted a system of rationing.

WORLD TIN PACT?

THE International Tin Study Group at its meeting at the Hague has forwarded to the member Governments a report on the advisability of entering into an international tin agreement and inquired whether they would be willing to attend a conference to confirm it.

If this meets with sufficient support the Secretary General of the United Nations will be asked to convene such a conference next spring.

A compromise on price level between producers and consumers was eventually reached at the Hague discussions.

TECHNICAL SCHOLARSHIPS

TWO research scholarships, one in technical chemistry, the other in chemistry, have been offered by the British Coal Tar Research Association to the Royal Technical College, Glasgow.

The scholarships, which were announced at the annual meeting of the governors of the college, will have a value of £250 a year each, and there will be an additional sum of £225 for equipment and other expenses. There are now 5456 students at the college, compared with 3791 in 1938/39. Sir James French has been re-elected chairman of the board of governors.

Oil Refining

Scheduled Increase by 1952

A THREE-FOLD increase by the end of ERP in 1952 has been scheduled by the United Kingdom, which hopes to lift its oil refining capacity from the 7 million tons expected in 1949 to 21.3 million tons in 1952. In addition, the United Kingdom plans to increase her overseas refining capacity from 2 million tons in 1948 to 9.6 million tons in 1952.

With imports of more than 4 million tons of crude oil and petroleum products already authorised under ERP, Western European nations have been given a breathing space to permit them to restore and expand their own petroleum production capacity on a large scale. From the beginning of ERP on April 3 up to September 20, a total of \$129.6 million worth of ECA—financed oil, petrol, lubricants and other petroleum products has been made available to nine European countries in danger of being seriously curtailed because of their shortage of dollars. \$44 million to France, \$44 million to the United Kingdom; \$17.5 million to Italy and the rest to Denmark, Norway, Greece, the Netherlands, Western Germany and Austria.

NEW £4 M. OIL DOCK

A PROPOSAL to construct a new oil dock near the entrance to the canal at Eastham has been agreed by the directors of the Manchester Ship Canal Company and a Bill is to be promoted in the present session of Parliament seeking the necessary powers.

The dock will have an entrance lock approximately 800 ft. long and 100 ft. wide, and will accommodate tankers of 28-30,000 tons. The construction is expected to take about three years at an estimated cost of £4 millions.

Discharging facilities for cargoes of crude petroleum will be provided by the dock for the new refinery being constructed by the Shell group at Stanlow.

Reduced Metal Subsidies

A statement by the Financial Secretary of the Treasury (Mr. G. Hall) in the House of Commons on Monday indicated that ferrochrome was the only department of the metal industries to receive an increased subsidy (£100,000) in 1948-49. Of the others, steel was receiving £3.250 million, against £7.918 million in 1947-48, magnesium nothing (against £107,000) and aluminium nothing (1947-48 nil; 1946-47 £953,100).

New Powder Technology

German Consultant in Scotland

THE Scottish Council (Development and Industry) has sponsored a visit to Scotland of Dr. Robert Meldau, a German scientist, who for a number of years has been making an extensive study of physical properties common to all powdered substances. By breaking down a variety of minerals and other substances to powder form, Dr. Meldau has already produced important results which indicate that even poor quality minerals can be of considerable value in the manufacture of substitutes for more expensive or scarcer products.

New Ceramic

Dr. Meldau attended a Press conference in Glasgow recently at the beginning of his three weeks' visit to Scotland, and gave practical illustrations of the steps which have been taken in this new department of powder technology by demonstrating a variety of coal ceramic which displays a high degree of resistance to heat, acid, atmospheric attack and is of sufficient structural strength to allow its use in certain forms of machine bearings. The Scottish Council has in mind its application to agricultural machinery.

Dr. Meldau pointed out that the same technique opened up interesting new fields in food treatment along lines quite different from normal dehydration, and he has with him samples of a vegetable meal produced by his new process which is of high sugar, protein and vitamin content, and which has already been used in Germany as a special food for miners.

Another allied process in which Dr. Meldau is interested is that by which peat can be used as a substitute for wood and other scarcer materials in building. Although looking like stone, this new peat material in its present form is of sufficient strength only for internal purposes, but it forms an excellent interior wall with a high degree of noise insulation.

Dr. Meldau is consultant to the Ruhr mining industries and a lecturer on applied mineralogy at Munster University.

The Week's Coal Output.—Last week's total output of coal in Britain was 4,241,200 tons (4,035,800 tons deep mined, 205,400 tons opencast), compared with the slightly greater total in the previous week of 4,275,700 tons (4,045,300 tons deep-mined, 230,400 tons opencast). The cumulative output of deep-mined coal for the 43 weeks of this year was 161,379,100 tons, compared with 152,333,300 tons in the corresponding period last year.

New British Pharmacopœia is Launched

Substantial Changes Since 1932 Edition

THE lecture hall in Bloomsbury Square, London, of the Pharmaceutical Society of Great Britain was packed on October 28, when Dr. C. H. Hampshire, secretary of the British Pharmacopœia Commission, gave an interesting address on this long-awaited 1948 edition of the British Pharmacopœia.

The last BP appeared in 1932 and it was intended to produce a revised edition every ten years. The next volume was, in fact, well under way at the outbreak of war, but it was impossible to complete it, and a series of six addenda was issued to keep as up to date as possible the progress of medical knowledge.

New Additions

Dr. Hampshire explained the magnitude of the work, and the wide scope of the new volume, embracing the old drugs such as senna and oil of rosemary, to the modern chemotherapeutic drugs—sulphonamides and penicillin—and the hormones, injections and vitamins.

Boric acid ointment had been retained because of the public's confidence in it, the doctor said, although the boric acid content was so reduced as to be practically valueless; on the other hand, 11 crude vegetable drugs had been deleted as of insufficient clinical importance.

Another change was the substitution of weight per millilitre for specific gravity, except in the case of alcohols where it was retained to conform with statutory requirements.

When discussion and questions were in-

vited, it was asked: what steps were being taken to put advance copies of the pharmacopœia into the hands of the manufacturer? At present, the questioner pointed out, any alterations and new regulations became effective immediately on publication of a new edition and, although advance copies could be consulted, they were extremely hard to come by.

Dr. Hampshire replied that it was hoped that as soon "as the Government could spare time from nationalising everything," conditions would be so amended that a specific period of time, perhaps three months from the date of publication, would be allowed before any changes came into effect.

The next speaker regretted that it had not been possible to decide on a uniformity of tablet sizes.

The possibility of dropping of Latin titles was raised, but Dr. Hampshire contended that Latin names were essential for international standards and nomenclature.

Some Omissions

Another speaker regretted the omission of the alkaloids of opium, considerably used to-day. The doctor replied that, while the commission endeavoured to include all the latest developments, this was one of several subjects under survey, but it was not completed in time.

It was noteworthy that practically all speakers agreed that the magnitude of the work and detailed investigation necessary had produced a volume well up to the established reputation of its predecessors.

Synthetic Quartz Crystals From Powdered Silica

AMONG the new products and processes described in the September issue of *Chemical Industries* (New York) is the growth in steel "test tubes" by Bell Telephone Laboratories of quartz crystals identical with those produced by natural processes.

A clear crystal more than an inch long can be grown in a month, and owing to the controlled uniformity of production, they are stated to be superior to natural ones.

Natural quartz crystals and also the synthetic ones known as EDT (ethylene diamine tartrate) are widely used in telephone communication. Both real and synthetic are piezo-electric—able to convert mechanical energy to electrical energy or *vice versa*.

When electrical current is applied to them they vibrate at certain specific frequencies.

Quartz is also used extensively in maintaining frequency standards in radio.

The synthetic crystals are grown from a finely powdered form of silicon. This is placed in the bottom of the steel "bomb" and an aqueous alkaline solution is added. The seed plate, a thin wafer of quartz, is suspended at the top of the vessel, which is then sealed and placed in a furnace.

Submitted to pressures exceeding 15,000 lb. p.s.i. at temperatures of about 750°F. the silica dissolves. In its dissolved state it rises to the cooler part of the bomb and is deposited on the seed plate, in perfectly regular order until all is in the form of a single clear crystal.

SULPHURIC ACID PRODUCTION

Small Reduction in July-September

THE three-monthly classified summary issued by the National Sulphuric Acid Association reveals a small general reduction in the period July-September, 1948. The total quantity of acid produced during the quarter was 382,741 tons compared with 398,744 tons in the period April-June.

SULPHURIC ACID AND OLEUM Tons of 100% H₂SO₄

	Chamber only	Contact only	Chamber and Contact
Stock July 1, 1948	82,451	27,131	59,582
Production ...	171,440	211,801	382,741
Receipts ...	38,758	28,619	67,377
Oleum feed ...	—	2,947	2,947
Adjustments ...	-12	-3	-15
Use ...	98,448	79,571	178,019
Despatches ...	111,668	159,374	271,042
Stock Sept. 30, 1948	32,521	31,050	63,571
Total capacity represented ...	216,270	223,300	439,570
Percentage production ...	79.3%	94.6%	87.1%

RAW MATERIALS Tons

	Pyrites*	Spent Oxide and H ₂ S	Sulphur Cocent	Zinc trates
Stock July 1, 1948	71,551	167,146	80,740	24,870
Receipts ...	64,805	56,582	51,566	30,219
Adjustments ...	+1,041	-7,462	-112	-215
Use ...	74,616	49,678	64,147	41,467
Despatches ...	2	4,435	53	—
	41†	269†		

Stock Sept. 30, 1948 62,738 161,884 67,994 13,407
* "Receipts" and "Use" include Anhydrite "converted" to Pyrites.

† Used at works for purposes other than Sulphuric Acid manufacture.

CONSUMPTION OF SULPHURIC ACID AND OLEUM UNITED KINGDOM AND IRE July 1, 1948, to September 30, 1948

	Tons 100% H ₂ SO ₄
Accumulators ...	2,344
Agricultural purposes ...	9,790

Quantities delivered were slightly less. Of consumption, the total was 383,380 tons compared with 406,879 tons, but in individual items phosphate (industrial) and rayon and transparent paper showed an upward trend.

The list given here reproduces the figures of the survey.

	Tons
Bichromate and chromic acid ...	2,600
Borax and boric acid ("Unclassified") ...	...
Bromine ...	1,799
Chlorosulphonic acid ("Unclassified") ...	...
Clays (Fuller's earth, etc.) ...	1,961
Copper pickling ...	639
Dealers ...	4,398
Drugs and fine chemicals ...	2,432
Dyestuffs and intermediates ...	19,171
Explosives ...	3,098
Export ...	922
Formic acid ("Unclassified") ...	...
Glue, gelatine and size ...	324
Hydrochloric acid ...	15,471
Hydrofluoric acid ...	1,999
Iron pickling (incl. tin plate) ...	20,258
Leather ...	1,621
Metal extraction ...	818
Oil (mineral) refining ...	10,398
Oil (vegetable) refining ...	2,016
Oxalic, tartaric and citric acid ...	1,963
Paint and Lithopone ...	17,400
Paper, etc. ...	988
Phosphates (industrial) ...	1,322
Plastics, not otherwise classified ...	2,678
Rare earths ...	605
Rayon and transparent paper ...	37,648
Sewage ...	2,632
Soap and glycerine ...	1,017
Sugar refining ...	170
Sulphate of alumina ("Unclassified") ...	...
Sulphate of ammonia ...	60,523
Sulphate of barium ...	1,288
Sulphate of copper ...	2,086
Sulphate of magnesium ...	1,603
Sulphate of zinc ...	635
Superphosphates ...	110,296
Tar and benzol ...	4,278
Textiles ...	5,709
Unclassified—Uses known ...	18,409
Uses unknown ...	10,576
Total ...	383,380

Britain Supplies Latest Margarine Plant to Italy

A COMPLETE margarine production plant is to be shipped from England to an Italian firm in Verona. The undertaking is being carried out with the approval of the Italian Government and is considered of national importance in the country's rehabilitation plans.

The plant will be supplied by Bamag, Ltd., of London, and will incorporate all modern practice. It is designed to refine the oil by a semi-continuous process reducing loss to a minimum, and hardening will be effected by the nickel formate process, hydrogen being supplied from a Bamag electrolyser. The hardened oil is then filtered, post-refined, and finely de-

odorised at high temperature and a vacuum of less than 8 mm. Hg. After the oil is cooled and put through the polishing press it will be stored in a number of tanks according to its characteristics.

These various oils and fats are to be weighed, mixed, and emulsified with fresh milk prepared in a specially designed milk ripening equipment and chilled over a margarine drum. In another part of the plant the material will be continuously kneaded and packed automatically into bricks of 100, 250, and 500 grammes at the rate of 70 bricks a minute.

The factory will also comprise a laboratory which will include the pilot-size Bamag Express hydrogenator.

The Assault on Scientific Freedom

Sir Henry Dale on Lost Ideals

SIR HENRY DALE was the principal speaker at the evening session which formed part of the open meeting sponsored by the Atomic Scientists' Association at Beaver Hall, Garlick Hill, E.C.4, on Saturday (October 30).

The theme for discussion was the necessity for free interchange of scientific ideas and discoveries between nations, and the danger that the secrecy unavoidably imposed on certain military aspects of atomic energy and nuclear research might spread to other departments of science and chemistry.

Sharing Knowledge

Sir Henry Dale, who seemed at times to be representing a minority view regarding the causes of deterioration of scientific relations, pointed out that a community of scientists who believed in exchanging and sharing their views had formerly existed for centuries. Even wars had left little division among them and he quoted the example of Henry Davy being fêted in Paris even when we were at war with France.

There was an international congress in 1907, but the outbreak of war in 1914 brought the first serious setback to free exchange of ideas.

After the 1914-18 war, Sir Henry continued, a larger part of science remained secret than ever before, but the main current remained free and it was essential that it should do so, for science was the most completely international of all man's intellectual activities. This was an ideal which ought on no account to be relinquished. At present we were being forced very far from it. Liberty was still the most impor-

tant subject of corporate human action.

We must remain alert and watchful against encroachment upon scientific freedom and to ensure that military application was not allowed to hinder progress.

Work was still in progress on the potential use of bacteriology and chemistry in warfare, but no one suggested that bacteriologists or chemists should be restrained—they come and go freely, and so should those working on atomic energy. The atomic scientist must be punctiliously loyal, and there could then be no reason why he should be hampered.

"I believe," stated Sir Henry, "that the only effective prevention of war is the complete abolition of all military secrecy, but it is no use this coming from one side or one country only."

Purge in Hungary

The worst threat to freedom to-day came from the U.S.S.R. where there was enforced conformity by terror to a political creed. There had been nothing like it, Sir Henry declared, since the cardinals bullied Galileo into recanting. He had received and was continuing to receive pathetic letters from Hungary where there was a drastic purge in progress, and scholars were in danger of dismissal for political opinions. The speaker also cited recent evidence of coercion of scientists in Moscow.

We must, he concluded, try to meet the genuine scientists so long as it did not affect them adversely, and we must beware of those who were political time servers, and above all remain watchful and ready to stand against any attempt to let science fall victim to political turpitude.

ROLE OF TECHNOLOGY

THE necessity for a great increase in the technical knowledge of young men in industry was emphasised by Sir Edward Appleton, secretary of the Department of Scientific and Industrial Research in his address at the annual dinner of the Staffordshire Iron and Steel Institute at Wolverhampton. Britain, he said, was still pre-eminent in research, but this was of no value unless the potentialities and results from it were fully and rapidly understood and the results applied.

Practical training in technical colleges should be supported by local industry, he urged, and technical training to be useful must be linked with research.

ENGINEERING RESEARCH

A NON profit-making organisation, jointly financed by industry and the Government, the Production Engineering Research Association has been opened at Staveley Lodge, Melton Mowbray. The objects of the association, which is under the presidency of Lord Riverdale, are to discover improvements in methods of production and ensure their prompt and effective application. Opening the association's new laboratories, Sir Geoffrey Heyworth, chairman of the advisory council of the Department of Scientific and Industrial Research, declared that technical progress in England was dependent on the skill and prompt application of research results.

SAFEGUARDS IN INDUSTRIAL CHEMISTRY

Many Interests Collaborate at Harrogate Conference

SOME 200 delegates, most of whom hold executive posts in chemical manufacturing concerns throughout the country, attended a conference on accident prevention in chemical works, held at the Grand Hotel, Harrogate, from Friday to Sunday, last week. The conference was sponsored by the Association of British Chemical Manufacturers and was organised on its behalf by the Royal Society for the Prevention of Accidents.

Sir Harold West (Newton Chambers and Co., Ltd.), presided at the opening session on Friday evening, which was addressed by Sir Ewart Smith, technical director of I.C.I., Ltd. Also present were Sir Harry Jephcott (chairman of council, ABCM), Mr. J. Davidson Pratt (director and secretary, ABCM), who presided during subsequent sessions, Mr. H. R. Payne (chairman of the association's works safety committee), who took charge of a brains trust on Sunday morning, Mr. G. P. Barnett (H.M. chief inspector of Factories), and Mr. H. G. Winbolt (director, industrial safety division, Royal Society for the Prevention of Accidents).

A point made by Sir Harold West at the opening session was that the worst way in which to attract worth-while men to the industry was to say that the work was safe. The operative word, in his view, was not "safety"; for recruitment it was better to emphasise that there was an element of excitement, opportunities for the display of resource and courage, with, of course, the assurance that management was concerned about their welfare. The main objective of the conference was to prove that managements knew how to handle the problem and were not working "by guess or by God."

Too Negative

Sir Ewart Smith, who during the war was chief engineer and superintendent of Armament design in the Ministry of Supply, in his address, confirmed that the old cry of "safety first" was negative and wrong. He preferred the positive approach.

Accident prevention afforded a measure of industrial efficiency; the good factory, the safe factory, was clearly one in which the man was put before the machine, and the machine was not allowed to be master of the man.

We had, of course, to look at the problem of safety and accident prevention in pro-

portion as well as in detail; the chemical industry was not, by ordinary standards, a terribly dangerous one. He mentioned cases in which the accident frequency rate was appreciably lower in high-pressure than in low-pressure chemical processes, the reason being that the designers, operators and maintainers of the plant appreciated the potential dangers and guarded against them.

The Safety Officer

Sir Ewart gave highest praise to safety officers, for, he said, they constituted a most essential and important part of the organisation. But the prevention of accidents and the control of conditions in the works was the direct responsibility of management at all stages, from the chairman or managing director down through the works manager, the plant managers, sectional managers, foremen, charge-hands and leading hands, and the workmen themselves were not excluded.

The safety officer's functions were as the adviser and the specialist, who educated people, sold his ideas, was critical, with an independent eye on what was done, whether in connection with design or in operation of plant or processes.

The human psychological approach to the problem could be tremendously helpful and could have results out of all proportion to the efforts expended on it. If they conducted their safety campaigns as something to which they were driven by legislation or, even by feelings of humanity, because they did not like to see a man carried away on a stretcher, that in itself would not bring out the whole-hearted confidence and co-operation of the workers.

If the worker really felt that they had his interests at heart, if they took him into their confidence, explained what the situation demanded and what had to be done to meet it, then the effort expended in so doing, the right psychological background, would have a most important effect. He doubted whether managements learned as much as they might through the eyes of their workers.

The provision of a safety organisation for safety did not mean that the management had to employ a lot more people. It meant that, where a factory unit was large enough, there should certainly be a whole-time safety officer, and if it were smaller there

should be a part-time safety officer, an advisory specialist keeping a particular eye on the safety aspect.

It should mean that there would be safety conditions, an organisation for educating all concerned, the management and the men, in organised safety and other relevant subjects. He believed that, with the growing complexity of industrial life, we had to devote a greater proportion of our time and effort to training. That rule applied to safety also. He referred to a large organisation abroad which reckoned that every man there—and there were tens of thousands—spent 20 minutes per week on safety training or inspection of some sort. The management were hard-headed people, but that practice was what the situation demanded.

Previous Attempt

Mr. J. Davidson Pratt referred to an organisation known before the war as a Committee on Solvents, which had collected information on various solvents, some of which had been thought to be safe but were in fact dangerous toxic agents. The work had had to go into abeyance; but immediately after the war he had pressed the Medical Research Council very strongly to revive its activities.

More than a year ago they had set up a Toxicology Committee, which was now getting into its stride, and which should be prepared to have investigated the properties of new compounds which might come into use or potential use and where the firms making it had not the facilities for the work themselves. Associated with that, the Medical Research Council's Toxicology Unit was prepared to undertake work of that sort, although facilities were limited.

The first thing we had to do was to know

thoroughly the properties of the compounds, and then the chemical engineers were quite capable of designing plants and processes, to ensure that those compounds could be handled with complete safety. The chief danger tended to arise in using industries which were perhaps not quite so safety minded.

Mr. Davidson Pratt also emphasised the importance of the proper investigation of near accidents, from which we could learn a great deal to prevent accidents arising from similar circumstances later.

In the course of discussion a question was asked as to the wisdom or practicability of offering awards to workers having records of freedom from accidents. Sir Ewart Smith's first reaction to the question was that it was the duty of every workman and every staff man to avoid accidents; it was a duty to his fellows. To offer a reward for freedom from accidents would appear to be grandmotherly. What could be done when a man left a bucket in a gangway, for instance, and someone else fell over it and was injured? Who would lose the bonus? It seemed that such a scheme would be difficult and he felt also that it was a wrong approach to offer a bonus for something negative.

The speaker who had raised the question said he had had in mind also some form of penalty, of laying the blame at the door of the person responsible for an accident.

A subsequent speaker referred to a case in which awards had been offered for freedom from accidents, and said that the accident frequency rate was not reduced.

At the conclusion of the proceedings on Sunday the delegates agreed that the success of the conference justified organising another on other subjects in about a year's time.

The Influence of Chemical Plant Design

MR. J. E. BRAHAM (I.C.I., Ltd.), in his paper on "Some Aspects of Chemical Plant Design," said industrial accidents had been variously classified, and as an introduction to the present paper it might be expected that data would be presented in a form to show that the majority of accidents could be prevented by correct design of plant and buildings, design in the widest sense, including layout, painting, lighting, ventilation and other related matters. Although it was, of course, true that very many accidents were due to faulty design, such an approach to the subject of this paper would break little, if any, new ground, and would therefore have little chance of making any contribution of real value to the problem of industrial accident prevention. It was

rather the intention to present some suggestions for a rational approach to the organisational problem of ensuring that during the design phase everything possible was done to ensure the safety of the personnel who would later have to construct, erect, operate and maintain a plant or factory.

It was seldom that much can be done in the laboratory to minimise the problems of the engineering designer, said Mr. Braham, but in some cases changes, such as, for example, a change of chemical route, could be found which made a valuable contribution. What was important was that the full implications of the chemical process should be realised at as early a stage as possible, and that the safety, medical and operating

department should be consulted before the details of the process were finalised. It was not suggested that the development of a chemical process should be determined by medical, safety and operating considerations, but that the chemist should realise the problems he was creating, so that he could make his contribution to ensuring that no avoidable difficulties should be passed on to the engineering designer.

As soon as the chemical process had been sufficiently developed for design of plant to commence, continued the speaker, a fully detailed chemical or technical flowsheet should be prepared. It was not sufficient that this flowsheet should merely set out the substances to be used in the process and the pressures and temperatures involved, but that it should provide as much information as possible on such factors as solidification temperature, boiling point, disintegration temperature or flash point of liquors, ignition conditions for gases and their toxicity, air-dust explosive concentrations for solids which have to be subjected to comminution and the effect on the skin of gases, liquids and solids used in the chemical process. The most certain method of dealing with these various issues was to prepare a questionnaire. The precise form and scope of this must naturally be determined by the general nature of the chemical industry involved, but it was not difficult to produce one which, if systematically answered, would draw attention to all the important problems which must be solved.

General Survey

At the stage when the chemical flowsheet and the answers to the questionnaire were available, the project should be reviewed by the engineering, medical, safety, operating and welfare officials or departments, said Mr. Braham. The resulting opinions and recommendations, which it was suggested should be recorded in writing, should then be investigated by the chemical research and development departments as well as by the engineering design department, in order that an agreed basis for the design of the plant should be determined. The engineering design department, then being in possession of approved technical flowsheets, should prepare engineering line diagrams for the plant, incorporating all information necessary for the preparation of design drawings of the various items of equipment, whether for direct fabrication or for the issue of inquiries to suppliers, and for the preparation of layout drawings.

Safety in engineering design, continued Mr. Braham, must be considered under the following heads:—(1) The preparation of engineering specifications for plant, buildings and equipment, whether they are to be

designed by the company or the company's supplier. (2) The design of the individual items of plant and equipment. (3) The preparation of the layout drawings for the complete plant or factory.

Obviously, the ultimate responsibility for the safety aspects of the design of a chemical plant or factory rested with the management of the company, commented Mr. Braham, but managerial responsibility must, for obvious reasons, be confined to safety policy and to ensuring that adequate and competent staff were available, and that the company's organisation, both from a personnel and technical point of view, was a satisfactory one. It was most desirable that responsibility for carrying out the company's safety policy in the design stage of a particular project should be vested in one rather than a number of persons. It might naturally be felt that the responsibility should be given to the company's safety officer or corresponding official, but it was better that this official's functions should be purely advisory, and that the executive responsibility should be placed elsewhere.

Wide Experience Needed

It had been suggested that the responsibility for design work should be placed on a man of wide practical experience rather than on an expert technician, Mr. Braham said. That principle was strongly advocated also in regard to the safety aspects of design, and the best arrangement was with little doubt that the control of design, both technical and from the safety point of view, should be entrusted to one and the same person.

As was necessary with the technical aspects of chemical plant design, safety features must be based on sound principles if satisfactory results were to be realised. Definite legal requirements for ensuring safe conditions in plants and factories existed in the Factories Act (1937) and in various statutory rules and orders, or statutory instruments as they would in future be designated. These requirements, while being specific in a general sense, were not in themselves sufficiently detailed in all cases to define the precise principles to be followed in each of the many cases confronting the designer. A strong plea must be made that the chemical industry, with its many and varied and often difficult problems, should provide its designers with detailed safety codes and regulations.

Experience of the preparation of such codes and regulations had shown clearly the need for those documents. The existence of widely varying opinions and the paucity of information on many important points had emphasised this need. It was, of course, true that, in addition to those

already mentioned, there existed many publications dealing with safety: these provided much of the information which was required by the designer, but often unfortunately not in a wholly suitable form. What was wanted by the designer was a cyclopedia rather than a treatise, a cyclopedia fully indexed and also fully cross-referenced to legal requirements.

The provision of safety codes and regulations for chemical plant design, however comprehensive, would not, of course, of itself give rise to plants and factories which were satisfactory from the point of view of safety. Managerial interest at all levels was an essential requisite, and this interest must take a practical form involving the institution of effective methods of ensuring that the requirements of the codes and regulations were implemented. There must be nothing haphazard in the procedure adopted. The use of questionnaires and history sheets, which had already been mentioned, advocated as providing satisfactory means of checking that the required procedure was followed.

Codes and Regulations

Slavish and unimaginative following of requirements set out in codes must be avoided; codes should be guides to good practice, and regulations should be statements of statutory requirements and of the amplifications of these requirements necessary to meet special and local conditions, Mr. Braham continued. The purpose of a questionnaire was to ensure that all relevant matters shall be considered. In the preparation of one for the chemical research and development and the engineering specification stages of a plant or factory, it is suggested that it should be built up on the following framework. Starting with the substance involved in the chemical process, these fall into four main categories:—raw materials; intermediate products; by-products; final products. The substances in each of these could be further classified in three categories:—gases and vapours; liquids; solids. Finally, all the substances could then be classed under hazard categories such as combustion, explosion, corrosion, poisoning.

The meaning of each of the hazard categories must be clearly defined and understood, said Mr. Braham, so that, for example, substances producing dermatitis, silicosis, asphyxiation or paralysis shall be properly classified. To ensure correct classification and that no hazards were overlooked, the classification of the substance involved should be carried out by the medical departments.

In using a questionnaire of this form, all substances involved in the chemical pro-

cess, whether they introduced a hazard or not, should be listed under the first two groups of categories; this practice would minimise the chance of any hazard being overlooked, continued the speaker. Each substance should then be considered and entered in the hazard classification group with full particulars relative to the hazard or hazards it introduced such as flash point, explosive limits to toxic concentration. Recommendations should also be recorded as to precautionary measures such as, to take an extreme case, that the plant or section of plant handling the substance should be housed in a cubicle and operated by remote or automatic control.

The suggested organisational procedure for using the questionnaire was that the research and development departments should first list all the substances involved in the process under the first two groups of categories, and should give under the third any new knowledge which had been gained from the research and development work which was relevant to safety considerations. The questionnaire should then be passed first to the medical and then to the safety and operating departments, which should each enter in the third group all information necessary adequately to acquaint the engineering department of the hazards arising from the substances involved in the chemical process which must be taken care of in the design and layout of the plant or factory. Finally, the questionnaire should be passed to the engineering department.

The questionnaire for the use of the engineering design department was really a complementary document to that which had just been described, and should aim at ensuring that attention was given to such matters as safe positioning of discharge pipes from safety valves, guarding of machines, effective means of isolation of pressure vessels for maintenance purposes.

Chief Categories

Various forms for a questionnaire would suggest themselves, but whatever the form adopted, it must be fully comprehensive. It would usually be convenient for the main categories to be: Civil engineering items; mechanical engineering items; electrical engineering items; miscellaneous items. The civil engineering category could, for example, be divided under, to quote a few, the following sub-categories: railways, roads, footpaths, water supply, drainage, pipe bridge and culverts, wharves.

To ensure that the detail procedure adopted for guiding the design of chemical plant was followed, it had been recommended that all projects should be the subject of a history or progress record sheet. This document should cover all phases of

WIDE SCOPE FOR THE SILICONES

Some New Applications Impending

MR. W. K. GIVEN, of the chemical department of the (U.S.) General Electric Co., Pittsfield, Mass., in an address and demonstration of silicones to the American Society of Mechanical Engineers, recently, said he foresaw that many more products were due to be developed in what he described as this "new chemical family."

Because of the ability of the silicones to withstand extremes of heat and cold, to resist moisture, and to remain unaffected by most other chemicals, some of their uses would be revolutionary, he said.

Electrical equipment with a silicone insulating material "may bring about a change in our thinking. Instead of wondering how much heat the apparatus will withstand before the insulation breaks down, we may wonder how much heat it will stand before the copper begins to anneal."

A glass laminate produced from silicone resins was the basis of such insulation. A piece of this, placed for a week in an oven heated to 250°C. in the G.E.C.'s plastics laboratory showed improved mechanical and electrical properties at the end of the

baking. Silicone resins, in addition to their recognised contributions to oils, greases and rubber, would also be used to make varnish, enamels and paints to finish refrigerators, stoves, laundry, dairy and hospital equipment. Such finishes resisted acids, alkalis, fresh or salt water, oils and climatic conditions, and because of the ability of the silicones to resist heat, white finishes, such as those on ovens, would not discolour even when subjected to temperatures of 485°F. for long periods.

One of the silicone products, polyorgano-halogenopolysiloxane, was used to produce a water-repellant film employed, among other things, in the treatment of radio and radar insulators for aircraft, windscreens, camera lenses, textiles and paper. Porous porcelain filters so treated would permit the passage through them of compressed air, petroleum and solvents, but not water. A silicone water-repellant film, said Mr. Given, might some day be used to treat cloth for clothing.

In Aircraft and Industry

Silicone oil which did not thicken in low temperatures and become thin in high ones, was used for aircraft hydraulic systems for operating controls, permitting smaller piping, less liquid, and reducing the danger of fire from leakage because of its high flash point and low inflammability. One of the largest uses of silicone products at present was a mould release agent, which permitted rubber tyres, rubber soles and heels and other products to come out of the moulds more easily.

Many military and industrial uses of silicone rubber were outlined by Mr. Given. A sample which had been baked for 36 hours in an oven heated to 300°F. was shown to be still resilient. Used for military searchlight gaskets, it cushioned the glass lenses against shock and remained pliable over a very wide range of temperatures. It was used during the war on many 'planes for turbo-supercharger gaskets.

A freak product of silicone rubber research, the speaker recalled, was the "bouncing putty" currently being used to form the centres of golf balls, and a Detroit manufacturer was using it in a device to keep tables and chairs level.

Cement Plant in S. Australia.—It is hoped that the £A200,000 cement plant which is nearing completion at Birkenhead, S. Australia, will be in operation by the end of this year. Another cement company is planning to erect a plant at Angaston.

THE INFLUENCE OF CHEMICAL PLANT DESIGN

(Continued from previous page)

the work, from preparation of the chemical flowsheet by the research and development departments to the final design of the plant or factory by the engineering department or by the supplying firm. If this document was to be an effective instrument of control it was essential that there should be active managerial interest in it, and it was recommended that, as a matter of routine, it should be submitted at regular intervals to appropriate members of the management.

In conclusion, Mr. Braham said, two points must be stressed. The first was that the procedure advocated in his paper could never of itself ensure a chemical plant or factory which would be safe to operate and maintain. If freedom from accident was to be achieved, just as much attention must be devoted to operational and maintenance procedure as to design. As many accidents resulted from faulty maintenance or incorrect maintenance procedure as resulted from defects of design. The second point was that no system directed at the elimination of industrial accidents would be successful unless it had full management support and was given constant and active attention by the management.

(Summaries of the several other papers presented before the conference will be published next week)

Polymeric Processes

U.S. Application for English Patent

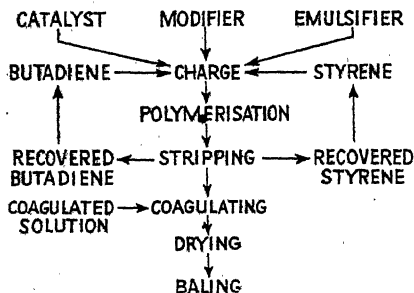
THE manufacture of polymeric material such as synthetic rubber is the subject of an English patent application—No. 2103/1948 (*THE CHEMICAL AGE*, October 2, 1948). The applicant is the Firestone Tyre & Rubber Co., Akron, Ohio, U.S.A. (Conv. date 12.3.47).

The present invention relates to the manufacture of polymeric materials from aqueous emulsions, and especially to separation of unreacted monomers from emulsions after polymerisation has been completed.

Usually an emulsifying agent, polymerisation catalyst, and generally a modifying agent are included to give good processing properties to the final polymer. The final emulsion containing dispersed polymeric material also contains unreacted monomers, and such dispersion is known as latex, the amount of which depends on the extent of polymerisation.

These monomers are generally highly volatile, also toxic, inflammable, and sometimes explosive. This inconvenience could be overcome by complete polymerisation, but this is nearly always difficult and undesirable.

In the present invention a process is claimed for recovering polymerisable material from emulsion or aqueous mixture by vaporisation and condensation, for which suitable apparatus is described in accordance with the following lay-out:—



"Depreciation and Maintenance"

Part III of Mr. S. Howard Withey's series of articles on depreciation and maintenance accounting for chemical plant is held out of the current issue owing to pressure of topical material. It will be published next week.

Oxygen Technology

Russian and German Processes

DETAILED information on the large-scale production of oxygen in Germany is included in a newly released report this week by the U.S. Office of Technical Services in which equipment used by the Messer Company, chief German manufacturer of large-scale air separation plants of other than Linde-Frankl design, is fully discussed. Other subjects in the report include the physical constants of gases; the acetylene hazard; operation at low pressure only; the Heylandt process; and the Kapitza (Russian) process.

The description of the Kapitza process, of particular interest to technicians during the past two years, was obtained through an interview with Dr. Linde, German authority on oxygen production. Dr. Linde questioned the theoretical efficiency of the process, and said that little is known concerning the extent to which actual installations have been made.

In the discussion of the acetylene hazard in oxygen production, the report points out that acetylene is sometimes present at the air intake in concentrations sufficient to produce a definite explosion hazard during the oxygen production cycle. Information is given on methods for determining the presence of acetylene and other hydrocarbons in liquid oxygen; and the successful use of recent silica gel adsorbers in removing these impurities is discussed.

High Purity Preferable

Throughout the report references are made to the commercial use of oxygen in quantity. There is evidence that, while the production of oxygen in purities up to 99 per cent requires rapidly increasing amounts of energy, its manufacture in concentrations of less than 95 per cent is not economic. It is believed that a better method for obtaining low-concentration oxygen is to mix a high-purity sample with air before use.

The report, in addition to a special bibliography, and list of personnel and plants checked, contains 51 figures providing data relating to large-scale production.

No. PB-88840. "Large Scale Production of Oxygen," the U.S. Office of Technical Services, Department of Commerce, Washington 25, D.C.

Soviet Zone Steel Targets.—The steel industry of the Soviet zone of Germany is stated to have been set a raw steel target of 148,000 tons for the second half of this year and of 30,000 tons of special and 110,000 tons of rolled steel.

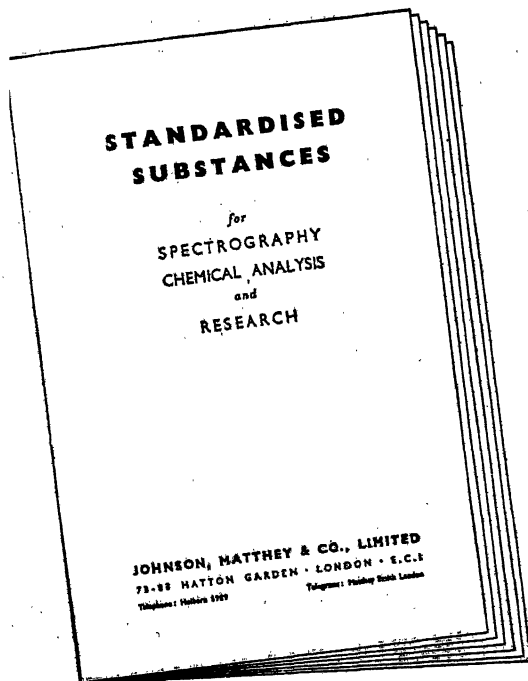
Metallurgical Section

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Metallurgical Section

6 November 1948

IRON AND STEEL NATIONALISATION

Proposals to Acquire 95 per Cent of the Industry

HOW wide is the scope of the Government plans for control by the State of British iron and steel production was revealed by the publication on Friday last week of the Iron and Steel Bill and by information afforded in ample measure by the Ministry of Supply.

The Bill sets out in its 88 pages provisions for taking over, probably on May 1, 1950, by an Iron and Steel Corporation of Great Britain 107 of the principal undertakings in the industry and their numerous subsidiaries, many of which are solely concerned with the production of finished goods of widely differing kinds. Approximately 300,000 workers are affected and £300 million is likely to be required to compensate existing stockholders. The firms named in the third schedule of the Bill have total issued capital of £195 million.

The proportions of the total to be taken over in the eight chief sections of the industry represent in the aggregate a little more than 95 per cent of the whole.

Recent Production

The criterion applied in determining what firms are intended to come under control by the corporation is shown to have been the scale of recent production. Thus the major undertakings affected are those whose annual output exceeds 50,000 tons of iron ore, 20,000 tons of pig-iron, ingot steel or hot-rolled steel materials. Their subsidiaries will automatically be absorbed regardless of their output. Smaller undertakings will not be taken over but will be subject to a licensing scheme, which will prescribe prices and conditions for their continued operation. This provision refers to firms producing more than 5000 tons of ore or other products but less than the prescribed maxima; those producing less than 5000 tons will be enabled to operate independently, but will be dependent upon the corporation for their supplies.

Considerable emphasis appears to have been given to the principle, contrasting with previous Bills for State control of industries, that the companies are intended to maintain their identities and individual trading arrangements, subject to overriding

control by the corporation, comprising a chairman and four to ten members, all appointed by the Minister of Supply. It is also proposed by the sponsors of the Bill that existing directorates will continue to function.

Among the many other provisions of particular significance are those which would permit the Minister to disclaim any agreements entered into without his sanction after October 28, 1948, and those under which compensation will be assessed. The latter afford stockholders the alternatives of compensation based on Stock Exchange quotations during October 1-25 this year or payment at the prices ruling immediately prior to the last election. No allowance is made for the fact that during both periods stock values were artificially low.

The companies named in the third schedule of the Bill as "fulfilling conditions for vesting of their securities" are as under:—

Arthur Lee & Sons, Ltd.; Bairds & Scottish Steel, Ltd.; Barrow Haematite Steel Co., Ltd.; Barrow Ironworks, Ltd.; Bayliss, Jones & Bayliss, Ltd.; The Beckermat Mining Co., Ltd.; Birchley Rolling Mills, Ltd.; The Briton Ferry Steel Co., Ltd.; Brown Bayley's Steel Works, Ltd.; Brynbo Steel Works, Ltd.; Burnell & Co., Ltd.; The Byfield Ironstone Co., Ltd.; The Bynea Steel Works, Ltd.; Cargo Fleet Iron Co., Ltd.; Carron Co.; The Clay Cross Co., Ltd.; Colvilles, Ltd.; Consett Iron Co., Ltd.; The Cranford Ironstone Co., Ltd.; The Crosby Ironstone Co., Ltd.; Darlington & Simpson Rolling Mills, Ltd.; The Darlington Forge, Ltd.; Darwen and Mostyn Iron Co., Ltd.; The District Iron and Steel Co., Ltd.; Dixon's Ironworks, Ltd.; Dorman, Long & Co., Ltd.; The Elba Tinplate Co., Ltd.; English Steel Corporation, Ltd.; The Etna Iron & Steel Co., Ltd.; Executors of James Mills, Ltd.; Fifth Brown Steels, Ltd.; Giers, Mills & Co., Ltd.; The Glamorgan Hematite Iron Ore Co., Ltd.; The Glynhr Tin Plate Co., Ltd.; Goldendale Iron Co., Ltd.; The Gorse Galvanizing Co., Ltd.; Guest, Keen and Nettlefolds, Ltd.; Guest, Keen & Nettlefolds (South Wales), Ltd.; Guest Keen Baldwins Iron & Steel Co., Ltd.; Hadfields, Ltd.; Hadfields Steels, Ltd.; The Hallamshire Steel and File Co., Ltd.; The Hodbarrow Mining Co., Ltd.; Irchester Ironstone Co., Ltd.; James Pain, Ltd.; J. J. Habershon & Sons, Ltd.; John Bagnall and Sons, Ltd.; John Baker & Bessemer, Ltd.; John Lysaght, Ltd.; John Lysaght's Scunthorpe Works, Ltd.; Johnson's Iron and Steel Co., Ltd.; John Summers & Sons, Ltd.; The Kettering Iron and Coal Co., Ltd.; The Lanarkshire Steel Co., Ltd.; The Lancashire Steel Corporation, Ltd.; The Lillleshall Co., Ltd.; The Lillleshall Iron & Steel Co., Ltd.; The Llanelly Steel Co. (1907), Ltd.; The Loddington Ironstone Co., Ltd.; London Works (Barlows), Ltd.; The Millom & Askam Hematite Iron Co., Ltd.; Monks, Hall & Co., Ltd.; Naylor Benson Mining Co., Ltd.; The Neath Steel Sheet and Galvanizing Co., Ltd.; The New Cransley Iron & Steel Co., Ltd.; The New Jarrow Steel Co., Ltd.;

The Oxfordshire Ironstone Co., Ltd.; The Park Gate Iron and Steel Co., Ltd.; Partridge Jones & John Paton, Ltd.; The Patent Shaft and Axletree Co., Ltd.; Pease & Partners Lingdale Ironstone Mines, Ltd.; Pease & Partners Normanby Iron Works, Ltd.; Raine & Co., Ltd.; The Renishaw Iron Co., Ltd.; Richard Hill, Ltd.; Richard Johnson & Nephew, Ltd.; Richard Thomas & Baldwins, Ltd.; Round Oak Steel Works, Ltd.; Samuel Fox and Co., Ltd.; The Santon Mining Co., Ltd.; The Sheepbridge Co., Ltd.; The Sheffield Forge and Rolling Mills Co., Ltd.; Shelton Iron, Steel & Coal Co., Ltd.; The Skinningrove Iron Co., Ltd.; Smith & McLean, Ltd.; South Durham Steel and Iron Co., Ltd.; The Stanton Ironworks Co., Ltd.; The Staveley Coal and Iron Co., Ltd.; The Staveley Iron and Chemical Co., Ltd.; The Steel Company of Scotland, Ltd.; The Steel Company of Wales, Ltd.; The Steel Company of Wales (Lysaght Works), Ltd.; Stewarts & Lloyds, Ltd.; Taylor Bros. and Co., Ltd.; The Templeborough Rolling Mills, Ltd.; Thos. Firth & John Brown, Ltd.; The Ulcoats Mining Co., Ltd.; The United Steel Companies, Ltd.; The Upper Forest and Worcester Steel and Tin Plate Works, Ltd.; The Wellington Iron Co., Ltd.; The Whitehead Iron and Steel Co., Ltd.; The Whitehead Thomas Bar and Strip Co., Ltd.; William Beardmore & Co., Ltd.; William Jessop & Sons, Ltd.; Wolverhampton Corrugated Iron Co. Ltd.; The Wolverhampton Steel and Iron Company (1946), Ltd.; W. Wesson & Co., Ltd.

WORKERS' BALLOT PROPOSED

A CHALLENGE by Mr. Geoffrey Summers, director of Shotton Steel Works, to the North Wales Area of the Transport and General Workers' Union, to conduct a ballot among the workers on the nationalisation issue, has been answered by the area secretary of the union, Mr. H. T. Edwards. In issuing the challenge, Mr. Summers had referred to a resolution of the area committee welcoming the Government decision to nationalise steel. He maintained that if a secret ballot was taken of steel workers at Shotton the result would be a majority against nationalisation. Mr. Edwards said he would gladly accept Mr. Summers' challenge to ballot his own union members at the steel works, but on certain conditions. One was that Mr. Summers agreed to debate the issue in public with him and to ensure that every worker was given an opportunity of listening to the debate. This would mean debating the issue three times to meet the requirements of each shift. Another condition was that the ballot should be taken outside the works, so that the public could feel assured it was conducted free from influence of trade unions and the firm.

Lethal "Smog"

Reports reflecting an extreme degree of atmospheric pollution come from the U.S.A. concerning the effects of "smog"—acid fumes combined with smoke and fog—in the steel-making town of Donora, Pennsylvania. A high concentration is thought to have caused the death of about 18 people in a single day, and to have affected about two hundred others, who are receiving treatment.

Growing Opposition

Scottish Steel Chiefs' Views

CRITICISING the Government's plans to nationalise the iron and steel industry, Lord Clydesmuir, a member of the board of directors of Colvilles, Ltd., said that he could not see the advantage of changing ownership from a wide section of the population to a bureaucracy at Whitehall. Lord Clydesmuir, who was addressing business men at a lunch given by the Glasgow Central Division of the Unionist Association, said that the Labour Party had made much of "private monopolies," but in Colvilles there were 14,000 shareholders and about the same number of employees.

Only a small percentage of the shareholders held more than 1000 shares. For every £1 of sales last year's dividends represented 2d., whereas wages, salaries, and superannuation represented 5s.

The case for the nationalisation of the industry was based almost entirely on old history, and it left out of account the magnificent record of the industry at the present time. Production was 10 per cent greater than in the peak year before the war, and prices were lower than in any other steel-making country except Australia.

It was argued that the men were working well only because of the promised nationalisation, but exactly the opposite argument had been used when nationalising the mines. Wages in the steel industry averaged over £7 compared with less than £4 in 1938. Good industrial relationship machinery existed for settling wages disputes, and there had been no major strikes for many years.

Many Anomalies

Scottish steel chiefs, opposing the Government's plans for State control of the iron and steel industry, are expected to provide greater resistance than has been brought against any previous measure of nationalisation.

Already, it is clear that they have strong grounds for complaint against the Government's plans, apart from the general principle of nationalisation. Many of the subsidiaries of the "Big Ten" to be nationalised in Scotland which are to be incorporated are engaged in the same kind of work as firms which are to escape State control. Accordingly, in certain fields of production the State will be competing with private undertakings. Nearly 30,000 employees in Scotland are affected by the Bill.

ELECTRIC FURNACE BRAZING

Economical Use of Low-Grade Copper

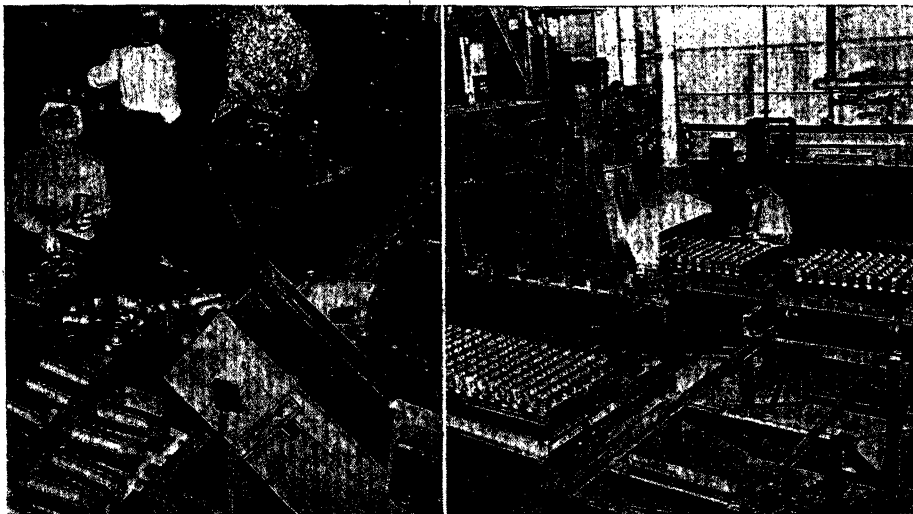
ELECTRIC furnace brazing has been found greatly to facilitate the fabrication of insecticide bombs at the Aer-A-Sol Division of the Bridgeport Brass Company, Bridgeport, Connecticut, where this method is reported to have improved the quality of the bombs, simplified their construction, and lowered manufacturing costs. The containers, which are made of U.S. SAE-1010 steel .043-.049 in. thick and contain a liquid insecticide under about 90 p.s.i. are manufactured at an average of approximately 10,000 per eight-hour shift.

Originally, these containers were made by a bonding method which involved locally heating each joint and using brazing metal and flux. With this method, considerable difficulty was encountered after brazing in removing deposits of charred flux from the interior of the bombs. This was necessary since loose particles tended to clog the .008-in. diameter opening of the specially designed dispensing valve of the bombs. In addition, there was the ever-present danger of corrosion from moisture trapped in the bomb.

With electric furnace brazing, inexpensive copper is employed as the brazing metal, and no flux is required. Conse-

quently, the bomb assemblies come from the furnaces clean and bright, no oxides or foreign matter are present, corrosion and moisture hazard are eliminated, and the bonds are uniformly tight and strong, testing almost 100 per cent free from leaks. In addition, all four of the assembly joints are bonded simultaneously in a single trip through either of the two General Electric Company's continuous furnaces. With this brazing process, the assemblies are put together with the brazing metal pre-placed near the joints to be brazed.

As the containers pass through the heating chamber of the furnace, a reducing atmosphere frees the metal from any oxides present, prevents the steel from oxidising, and thus prepares the parts to be wetted by the molten copper. When the brazing metal melts, it is drawn into the joints of the assemblies by capillary attraction and forms alloys with the steel. Transferred to the adjoining controlled atmosphere cooling chamber, the solidifying alloys develop great strength, and the bombs gradually cool to a temperature at which it is safe for them to come in contact with the outside air without danger of discoloration caused by oxidation. (Continued overleaf)



Placing in position the copper wire rings preparatory to brazing; (right) charging the containers into the electric furnace, to which the converter, seen in the background, supplies a reducing atmosphere to prevent oxidation and facilitate the metallic union

Each of the roller hearth copper brazing furnaces used in this application consists essentially of a heating chamber 9 ft in length and an adjoining water-jacketed cooling chamber 30 ft. long. The heating chamber is equipped with electric heating units rated 180 Kw, divided into two 90-Kw



The completed "bomb", a safe high-pressure container of spray liquids

zones, each with separate power and temperature control.

The heating units are made of heavy rolled ribbon, formed in sinuous loops, mounted in the roof of the chamber and on the side walls above and below the roller conveyor running through the chamber. The cooling chamber is made of two concentric rectangular steel shells to provide

a water jacket, and is divided lengthwise into three sections, each with a separate water circuit. The first section of the cooling chamber has automatic cooling water temperature control, to prevent condensation during idling periods.

Hollow cast alloy rolls are used throughout the charging vestibule, heating chamber, and the first section of the cooling chamber. Solid steel rolls are employed in the remaining sections. Water-jacketed, self-aligning roller bearings are mounted on the sides of the casing except in the last two cooling chamber sections, which do not require cooling. The rolls are motor-driven through a chain and sprocket mechanism.

Consumption and Output

Each furnace is capable of brazing 700 containers per hour, which is a production of 700 lb. net, or 1352 lb. gross per hour. For this rate of production, the power consumption is about 157 kWh. Consumption of combusted gas for the furnace atmosphere is about 1500 cu. ft. per hour, which is made by burning about 675 cu. ft. per hour of coke-oven gas.

Throughout, the bombs are fabricated almost entirely on an assembly line basis. Belts or roller conveyors carry them from one operation to another until they arrive at the furnaces, where they are manually placed in the brazing trays. The trays are then automatically charged into the furnaces and travel slowly through them on motorised conveyors. After being discharged from the furnaces and inspected, the dispensing valves are added and the bombs are air-tested, marked and charged with liquid insecticide and then with Freon under pressure. Attached to an overhead chain conveyor, they are cleaned, lacquered, and again inspected.

Solder is Still Indispensable

"NOTES on Soldering," by W. R. Lewis, the latest publication of the Tin Research Institute, Greenford, Middlesex, emphasises that more soldering has been done in the last few years than ever before. This is due to successful development from the copper-bit soldering process to fully mechanised methods for mass production of telephones, radios, radiators for motor cars, cans for foodstuffs and every kind of hollowware made from tinplate, sheet steel, copper and brass. In these modern industries, the soldering process has undergone obvious modifications, but it remains unchanged in

its dependence upon tin as the medium of the actual joining. As a means of economising in tin the low-tin solders were disappearing because, in general, the frequency of defective joints was so high as to constitute a serious waste of labour and materials and each used more solder and took longer to make. The chapters of the book deal with basic steps in soldering; mechanism and practical methods of soldering; joints in lead pipes; soldering of special metals and properties of solders and soldered joints. Included are 47 figures and many tables and bibliographical notes.

BRITISH WELDING PROSPECTS

Effect of New Technology and Cost Factors

By Dr. J. H. PATERSON, D.Sc., F.R.I.C.*

NO ferrous metal or alloy, and very few non-ferrous ones, has any worthwhile future unless it can be welded, either by one of the processes using electricity as a source of heat or by the oxyacetylene process. This means that the metal concerned must have such properties that its structure would not be unduly disturbed, and its mechanical properties adversely affected, by the welding process.

As metal manufacturers become more keenly aware of this requirement and metals generally come to have weldability as one of their basic properties, so the growth of the welding industry will be assured on an ever increasing scale. At the same time there must be an increase in the number and complexity of the welding processes and the young welding engineer of to-day is assured of a busy and exciting future in bringing this industry to perfection.

It is frequently said that common sense and enthusiasm are the main qualifications for a welding engineer, and this is true, provided that it is realised that no one can talk common sense about a subject with so many sciences forming its background unless he has a fundamental knowledge of these sciences.

It is right, therefore, that the Institute of Welding should set a high educational standard for the leaders of the welding industry and that this standard should be high enough to ensure that the senior members of the Institute can be regarded as masters of their subject.

Considering that the metallic arc welding process is only 56 years old, the amount of progress which has been made is extraordinary and this is equally true of the resistance welding processes. It is also obvious that developments in methods and application will have to be very wide indeed if they are to keep pace with the spate of new alloys which are finding their place in the engineering industry.

Greatest Expansion

The greatest expansion in recent years has probably been in the various arc processes, *i.e.*, the metallic arc, the helium or argon arc, the carbon arc, and the atomic hydrogen process, and this expansion is by no means at an end.

All these processes have one common factor, namely, that they employ electrical energy as a source of heat and it is remarkable that up to the present very little attention has been paid to the economic use of this energy. This is surely a matter which will require attention and might result in improved methods of welding coming to the fore.

It is not generally realised that, assuming the thermal efficiency of a power station generating electricity from coal is 20 per cent and that the thermal efficiency of the arc is 25 per cent of the power used, only 5 per cent of the energy originally contained in the coal is effectively set free in the arc, and that even then a high proportion of the energy is unwanted and even dangerous when the heat generated results in the serious disturbance of the structure of the metal being welded, or causes distortion of the work piece.

In addition to this, the ever growing size of the single phase load required for both metallic and resistance welding, accompanied as it frequently is by a bad power factor, is causing some power station engineers to look askance at the welding industry and even in some cases to take measures to safeguard their position, which may greatly handicap the future applications of the process.

Cost of Welding

Very large potential users of welding, such as the shipbuilding industry, are apt to criticise the cost of welding, claiming that it is too high to be universally used as in an all-welded ship, and users of steel castings are relying on a much dearer fabricated job mainly because of the shortage of labour in the foundries, although they would probably prefer the fabricated article if a welded one compared reasonably in price.

Thus it is clear that as a contribution towards reduction in cost the more economic use of energy becomes a matter of importance, not only from the cost point of view, but because of the better processes which would undoubtedly result.

There is already looming on the horizon in the shape of the inert gas shielded arc process, *i.e.*, a process using a gas shield of argon or helium, one method of welding which may show the way to a better thermal

*Summary of Dr. Paterson's presidential address to the Institute of Welding, at the Institution of Civil Engineers, London, S.W.1, on October 27.

balance sheet and hence to a more satisfactory welding process.

The use of one of these gases for shielding the arc appears to enable molten metal to wet the surface of the parent metal at comparatively low temperatures and there is no doubt that these processes are on the eve of considerable development.

They are, in this country at least, handicapped by the high cost of the inert gas but it is quite certain that with the extended use of argon the price will come down considerably, and even if there is no helium, it is not improbable that one of the nuclear fission processes will give us all the helium we want as a by-product.

Welding Research

We may, indeed, find the welder of the future pouring superheated liquid weld metal from an induction heated syphon under an atmosphere of argon or helium into the prepared groove in his welded joint, and this providing a weld of the exact composition and cleanliness desired, and at the right temperature to ensure the most satisfactory join without overheating the parent metal.

The impact of our sister organisation, the British Welding Research Association, on the future of the industry must not be forgotten. While this association may not be directly responsible for the production of new welding methods or processes, its investigations into the scientific foundations of the industry have already had a noticeable effect on the trend of method and application, which will undoubtedly grow with the passing years. Their investigations into the properties of rigid structures are only the opening chapters of a new theory and practice in structural design.

The work of the Electrical Research Association on the physics of the welding arc has only just commenced but will in the future add to our store of knowledge on a vital subject and the British Non-Ferrous Research Association places the problem of weldability in non-ferrous metals among its more important investigations, thus helping towards that desirable era when weldability will be taken for granted as an inherent property in our main structural metals.

All this wealth of investigation and research soon finds its way into industry and slowly but surely enlarges and improves the possibilities of the whole of engineering science. Giant welded fabrications, impossible of achievement by any casting or forging process, produce new engineering methods and welding makes possible the construction of high temperature resisting movements which go to the construction of the internal combustion turbine of the future. It is here that the Institute of Welding in the future will find its most important work.

Saving in Steel

Towards the end of last year the president of the institute (Mr. J. L. Adam) asked for a special report on the savings in steel made possible by welding, and specialists in a variety of industries, who could make accurate comparisons between similar welded and riveted structures which they had actually undertaken, were invited to do so. This report, not yet published, has already been of great value to one Cabinet committee dealing with economy in steel and will be of greater value when completed and published.

Standardised Threads : Anglo-American Agreement Sought

THE culmination of 30 years of study of screw threads, a joint conference of representatives of Government committees and industrial standardisation groups from Great Britain, Canada, and the U.S.A. is scheduled to meet within the next three months to conclude agreements on common standards for screw threads used on most types of threaded fasteners, including bolts and nuts. The attainment of such standards is of paramount importance to commerce and industry and could greatly increase the international exchange of engineering equipment.

It is planned to hold the forthcoming conference at the U.S. National Bureau of Standards, which has actively co-operated in the attainment of this objective over a period of years. These agreements will not be in the form of a treaty, but will be based upon

separate documents, each of which is sponsored by the standardisation group or groups of each of the countries concerned. These documents, setting forth the Unified Screw Thread Standard, will be in agreement on all fundamental points relating to the standard, but may differ in minor details. The purposes of the joint conference are to assure that there is complete agreement on all fundamentals and to celebrate the attainment of such agreement after many years of negotiations.

In September-October 1945, a conference on Unification of Engineering Standards was held in Ottawa, Canada. At this conference a unified form of thread having a 60° angle, together with standard sizes and pitches, was agreed upon. Thus the foundation was laid for the standards now being presented.

ELECTROLYTIC METAL POLISHING—III

Uses in Surface Study and Related Fields

MORE important even than its technical use in giving a fine finish to metallic articles is the very marked superiority of electrolytic over mechanical polishing as an effective means of studying surface phenomena and for metallurgical testing generally. This indeed was the basis of much of Dr. P. A. Jacquet's earlier work, and in his new book he devotes the whole of Parts 2 and 3¹, to these aspects: part 2 dealing with physico-chemical work and part 3 with micrographical studies.

Even this extensive survey relates only to magnesium, aluminium, and their alloys. Already this year new material has accumulated. For example, in *Comptes Rendus*, 1948, 227, 556-8 (September 13) he describes an improved method for anodic polishing of iron and steel, and chromium, for micrographic examination.

The electrolyte contains some perchloric acid, on the alleged dangers of which there has been much discussion, though it is held that these can be reduced to a minimum by careful working. However, one of the principal features in what is claimed to be an improved method over that of P. Rocquet of 1939 is the use of much less perchloric acid, whereby the risk is reduced and the process accelerated. The electrolyte may consist, for example, of 1000 c.c. acetic acid (pure crystalline), and 50 c.c. perchloric acid of 60-65 per cent strength and density 1.59-1.61. The two acids in these proportions mix readily without heat, and may in fact be used at fairly high temperatures without danger.

Best Electrical Values

The best polishing effects were obtained with an anodic c.d. of 11 amp./dm², although an amperage up to 30 may be used, the terminal voltage being 30-50 v. Polishing is controlled by simple regulation of cell voltage. The relatively high voltage mentioned may be reduced by adding a little distilled water; or by using a circular cathode—completely surrounding the anode—in place of a flat one. The time required is 2-3 minutes.

The main lines of the physico-chemical studies referred to consist in: (a) *aluminium and light alloys*—measure of reflecting power, X-ray diffusion and diffraction, X-ray micrography, electron diffraction, microgeometry, use of electron microscope; (b) *anodic oxidation of Al*—alumina film defects, new method for separating (isolating) alumina films², measurement of thick-

ness, and growth and structure; (c) *measurement of solution potential* and application; (d) *study of surface corrosion*—attack on Al in liquid medium, corrosion of Al generally, corrosion of pure Mg in damp air, high temperature oxidation of Al; (e) *measurement of micro-hardness* and uses thereof—effect of electrolytic polishing on hardness values of Al, metal diffusion in Al, determining solubility curves; (f) *study of lines of slip*—lines of slip and corrosion patterns, plastic slip in Al crystals.

Aid to Micrography

The advantages, technical and economic, of electrolytic polishing for purposes of micrographic examination of metals have been studied by Jacquet in some detail. Additionally, a useful summary of this and related matters and an extensive bibliography was presented by him in his paper read at the third International Electrodeposition Conference last year, the proceedings of which have just been published by the Electrodepositors' Technical Society.

There are undoubtedly many technical advantages in the new method, among which may be cited, in the first place, the complete elimination of streaks or scratches on the surface which are practically unavoidable with mechanical methods. This must necessarily be of great importance in micrographic or similar studies.

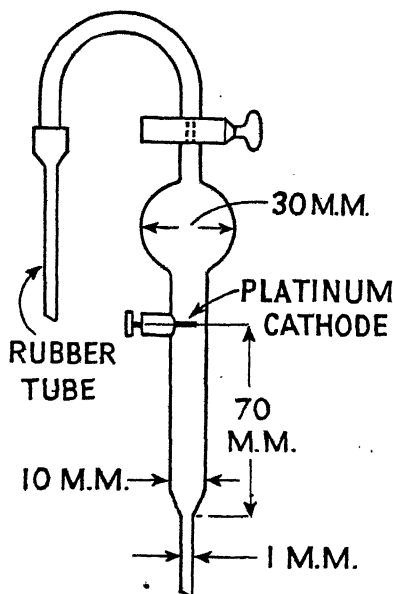
There is complete absence of oxide films or films due to cold working, rolling, etc., of which the former must be the more important; the latter may to a large extent at least be removed also by mechanical methods. The possibility of more complete or more reliable study of surface structure is another important recommendation. This is connected with the uniform solution of metal during electrolysis, e.g., structural changes due to mechanical treatments such as milling or abrasion.

A very high reflective power is attained. An aluminium surface mechanically polished usually has a thin milky opalescent film with reduced reflectivity. This, too, disappears with electrolytic polishing, and reflective power increases up to 90 per cent. The fifth consideration is the great value of preserving intact the actual heterogeneous structure of the surface and nearby layers, namely, original cracks or blow-holes, inclusions and general impurities, and so on.

There is the further advantage of clearly showing up intercrystalline boundaries, a matter of special difficulty in the study of some alloys, but of considerable importance.

Part I and II were published on September 2 and October 9.

Lastly, electrolytic polishing enables one to deal with specimens of fairly considerable size, and of varying shape and thickness—down to fractional mm. For examination of exceptionally large specimens, various techniques have been evolved. One of these is shown in the accompanying figure. This is an electrolytic micro-cell



for polishing very small areas of a relatively large specimen. It has been described by Knuth-Winterfeldt in *Jerkontorets Annaler*, 1944, 128, 77, and consists mainly of a pipette provided with a platinum cathode and an extremity of 1 mm. diam. which is applied to the part desired to polish.

The electrolyte is similar to that of De Sy and Haemers: 1 vol. perchloric acid with 4 vols. denatured ethyl alcohol (of which there are various modifications: Jacquet, *loc. cit.* pp. 47-55). A high c.d. is used (25-70 mA) and the time required is 10-15 sec.

A somewhat similar method has been described by Parcel (*Met. Prog.*, 1942, 42, 209; *Met. Ind.*, 1943, 62, 60). The device used by Russell of the Batelle Mem. Inst. (*Met. Technology*, 1941, September) is based on the same principle; but the cell is somewhat larger and a rubber joint between it and surface is used. Reference may also be made to J. Mazia's ingenious apparatus (*Monthly Rev. Am. Electroplaters Soc.*, 1947, 34, 937) for brush electrolytic polishing.

Owing to certain peculiarities in structure, notably of aluminium, due to inclusions or impurities, Jacquet observes that some metallographers have denied that the electrolytic method is more reliable than mechanical polishing supplemented by chemical action. He therefore adduces experimental evidence to prove the contrary, with special reference to copper and alloys, steels, etc.

Starting with his own work with copper of 99.98 per cent purity, this, whatever mechanical and thermal treatment may have been given by the usual methods did not reveal any trace of foreign elements; whereas electrolytic polishing showed clearly and definitely numerous inclusions, extremely fine, but unmistakable. They were almost entirely sulphurous, i.e., sulphur combined with copper and possibly also selenium and tellurium.

It is also shown on the evidence of F. H. Clark *et al.* that this method alone shows also the presence of cuprous oxides or pits and blowholes in the cast metal. With copper-glucinium (beryllium) solid solutions there is in each crystal a precipitation of Cu₂Gl definitely orientated.

Electrolytic polishing has shown, and X-ray and electron microscope examination have confirmed it, that this constituent does not form at the stage of maximum hardening in grains of the solid solution. The streaks or scratches (stries) in fact, indicate loosening or detachments (déchocages) along certain crystallographic planes. These are probably effects of corrosion at these points, caused by the reagents used. (*Comptes Rendus*, 1943, 217, 22; *Rev. Metallurg.*, 1944, 41, 1).

The dendritic structure of copper in lead bronzes is very indifferently observed in mechanically polished samples owing to wide differences in hardness of the constituents and to surface spread of the lead in the finishing operations.

Conflicting Views

In notes briefly comparing the various methods, from the point of view of micrographical and other studies, Jacquet considered that of De Sy-Haemers, either in its original or in its modified form, of special interest. With pure aluminium and homogeneous solid solutions, polishing with a very high c.d. gives satisfactory results, and fairly satisfactory, even when there are some impurities insoluble in the metal.

(To be continued)

REFERENCES

- 1 P. A. Jacquet: "Le Polissage Electrolytique des Surfaces Metallurgiques," Vol. I, 1948.
- 2 This new method described on pp. 104-5 of Jacquet's work, Vol. I, is that of Lacombe & Beaujard (*Ed. Comm. Tech. des Etats etc.*, 1944, Cf. also *Metaux-Corrosion-Usure*, 1945, 20, 43).

U.S. Metal Resources

Experts Review Some Scarcities

REVIEWING America's mineral resources position, with reference to stocks and reserves of aluminium, magnesium, copper, lead, zinc and lesser known metals and minerals, the views of a number of experts have now been presented by the National Industrial Conference Board, New York.

Dealing with the light metal industry, Mr. Irving W. Wilson, vice president of the Aluminum Company of America, stated that the annual capacity for the production of primary aluminium was increased from about 350 million lb. in 1939 to about 2300 million lb. in 1943; and the annual capacity for primary magnesium from about 7 million lb. to nearly 600 million lb.

Mr. Simon D. Strauss, sales manager of the American Smelting and Refining Co., said the copper industry to-day had actual copper reserves as large as it ever had.

"In the lead and zinc industries," stated Mr. Strauss, "occurrences are not so easily measured as with copper. There are very few lead and zinc mines which at any time have known reserves of more than five to ten years of life ahead of them, based on their then current rate of production. The production of lead in the U.S.A. to-day, with the highest prices on record, is little more than 60 per cent of the maximum production which was attained during the late 'twenties.'"

Of zinc, Mr. Strauss said that production to-day was somewhere between 75 and 80 per cent of what it was in the 'twenties. Based on the present peace-time use of copper, lead and zinc, the U.S.A. was not to-day self-sufficient.

Dr. Richard J. Lund, supervisor of Engineering economics for the Batelle Memorial Institute, Columbus, Ohio, said that among the other non-ferrous metals, antimony and tin were still so scarce that limited government control had been extended and re-extended over their distribution and use.

Canada's Growing Steel Industry

The building of a new blast furnace with a capacity of 1000 tons daily and the installation of a new plate mill form part of the scheme to expand Canada's steel industry. Construction is expected to take about two years.

This is reported to be the "minimum" programme, and it is likely that two blast furnaces may be built.

Iron Ore Discovery

150 M. Tons Reported in Labrador

THE discovery in Labrador of high-grade iron ore deposits, which may rival the Mesabi range in extent and quality of ore, has been described by Gilbert C. Monture, chief of the Mineral Resources Division of the Canadian Department of Mines and Resources, in a study prepared by the National Industrial Conference Board, New York.

"The new iron ore discoveries lie astride the Quebec-Labrador boundary," says this report. "Intensive drilling and exploration up to date have been confined to some 50 miles along the main ore zone. To the north-east and about 12 miles from the main ore zone there is a parallel group of deposits, but no work has been done on these."

Possible 300 M. Tons

The discovery has been compared with the great Mesabi Range in the United States. Relatively small-scale drilling has now proved approximately 150 million tons of ore. The objective is 300 million tons and it is hoped that this objective will be obtained this season.

A typical analysis of the ore is approximately as follows: iron plus manganese 62.7 per cent; phosphorus .101 per cent; sulphur .008 per cent; silica 4 to 6 per cent. An interesting discovery made at the close of the field season was that some of the ore was very high in manganese, running 6 per cent or better. There is a fairly considerable size body of this ore.

The objective of proving 300 million tons is necessary to warrant the building of a railroad—350 miles long—to the deposits.

There is the prospect of developing ample hydro-electric power from local rivers or the more distant Hamilton Falls and it is likely that the ore could be delivered at the nearest deep-water point at a freight charge of \$1.75 or \$1.80 per ton.

Other Canadian Resources

Canada is, Mr. Monture explained, deficient in antimony, chromite of metallurgical, chemical and refractory grades, manganese, and vanadium. "Almost our entire requirements of all these metals must be imported," he states.

As to other metals and minerals, Mr. Monture stated that Canadian refined copper production is now in the neighbourhood of 200,000 tons, while nickel is being produced at the rate of 120,000 tons a year. Metals in the platinum group total 230,000 oz. per year. In addition, Mr. Monture said that Canada is able to export "well over" 125,000 tons of lead and 140,000 tons of zinc annually.

Production and Stocks of N-F Metals

THE following particulars of production, stocks, consumption, imports and exports of non-ferrous metals in the United

Kingdom in September are extracted from the monthly figures supplied by the British Bureau of Non-Ferrous Metal Statistics.

UNWROUGHT COPPER

	Long Tons	
	Blister Copper	Refined Copper
OPENING STOCKS:		
Govt. and consumers' stocks	35,130	79,082
Imports into U.K.	15,973	21,648
PRODUCTION:		
Primary	—	12,537
Secondary	1,793	6,667
CONSUMPTION:		
Primary	12,621	29,836
Secondary	—	16,872
EXPORTS FROM U.K.	3,103	23
CLOSING STOCKS:		
Govt. and consumers' stocks	37,796	85,442

GROSS OUTPUT OF MAIN COPPER, ALLOY AND PRODUCTS

Unalloyed copper products	28,915 long tons
Alloyed copper products	25,204 " "
Copper sulphate	1,260 " "

UNWROUGHT ZINC

	Long Tons	
	Zinc in Concentrates (estimated gross zinc content)	Slab Zinc (all grades)
OPENING STOCKS:		
Govt. and consumers' stocks	21,617	61,341
Imports	2,072	9,877
PRODUCTION:		
Virgin and remelted	—	6,746
CONSUMPTION:		
Virgin (incl. debased)	7,408	20,006
Remelted and scrap	—	6,199
EXPORTS	—	19
CLOSING STOCKS:		
Govt. and consumers' stocks	16,012	55,706

LEAD

	Long Tons			Lead Content of second-ary scrap and Residues
	Lead in Concentrates	Imported Virgin Lead	English Refined	
OPENING STOCKS:				
Govt. and consumers' stocks	—	23,701	2,325	—
IMPORTS	12	10,103	—	—
PRODUCTION	184	—	3,612	—
CONSUMPTION	175	18,338	3,684	8,943
EXPORTS	1	57	—	—
CLOSING STOCKS:				
Govt. and consumers' stocks	—	16,324	2,253	—

TIN METAL

	Long Tons
GOVT. AND CONSUMERS' STOCKS AT END OF PERIOD	11,506
IMPORTS	155
PRODUCTION	3,287
CONSUMPTION	2,122
EXPORTS AND RE-EXPORTS	93

ANTIMONY

	Long Tons
TOTAL CONSUMPTION OF ANTIMONY METAL AND COMPOUNDS	454
TOTAL CONSUMPTION OF ANTIMONY IN SCRAP	310

CADMIUM

	Long Tons
TOTAL CONSUMPTION OF CADMIUM	63.05

Castor Oil as a Substitute in Steel Casting

CONSIDERABLE success is foreseen for the recent efforts sponsored by steel founders to find a substitute for linseed oil, which is still allocated by a Cabinet Committee dealing with scarce commodities. Used in steel casting as a binding material for sand cores, only about 2 per cent of the weight of sand is required, but 5000 tons of the oil are used in the process every year.

At a conference called at Leamington Spa by the steel castings division of the Iron and Steel Research Association, specialists from the Ministry of Food oils and fats division, steel and plastics concerns and the universities, explored the prospects of finding substitutes. It was considered that castor oil might be used, especially as it is likely to be in fairly free supply for the next two years.

Prof. T. F. Hilditch, Professor of Industrial Chemistry at Liverpool University, said on October 25 that it was remarkable

how many diverse interests were concerned in this particular problem, none of them being directly engaged in either smelting ore, casting steel or growing vegetable oils.

"LION BRAND" METALS AND ALLOYS

MINERALS AND ORES
RUTILE, ILMENITE, ZIRCON,
MONAZITE, MANGANESE, Etc

BLACKWELL'S
METALLURGICAL WORKS LTD.

GARSTON, LIVERPOOL, 19

ESTABLISHED 1869

American Chemical Notebook

From Our New York Correspondent

THE first plant designed and constructed in the U.S.A. for the production of low-purity oxygen for use in blast furnaces has begun operations at the Johnstown works of the Bethlehem Steel Company, which is associated with the Air Reduction Co., Inc., and the Koppers Company in the undertaking. Output of the plant will be taken by the Bethlehem Steel Company for experimentation in the use of oxygen for the enrichment of the air blast in furnaces. Spokesmen for the three companies said that when significant data had been accumulated as a result of this research work, it would be made available to the steel industry.

* * *

Adding to its growing list of protective literature, the Manufacturing Chemists' Association, Inc., this week issued Chemical Safety Data Sheet SD126 on phosphorus oxychloride, the 26th in its series of chemical product safety manuals, and Manual Sheet H-10 covering the handling and discharge of containers for hydrofluoric acid, both aqueous and anhydrous. Designed for supervisory staffs and management, the manual on phosphorus oxychloride presents essential information for the safe handling, storage and use of the chemical and names its physical and chemical properties. A comprehensive 22-page booklet containing eight illustrations, the manual on hydrofluoric acid supplements the Chemical Safety Data Sheet SD-25, previously issued.

* * *

Subject matter includes description of the product; general precautions, including complete data on hazards, first-aid and medical treatment; materials of construction, including piping, valves and fittings; detailed container practice for aqueous acid, including rubber drums, steel drums (lined and unlined), lead carboys, tank cars and tank trucks; instructions for handling and unloading cylinders of anhydrous acid, including detailed information on emptying the cylinder and introduction of the acid into process, both as a liquid and a gas. Copies of these booklets may be obtained from the Manufacturing Chemists' Association, Inc., 246 Woodward Building, Washington 5, D.C., U.S.A.

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The United States Atomic Energy Commission announced this week that negotiations are being conducted with the Vanadium Corporation of America for the purchase of uranium from two treatment plants scheduled to be

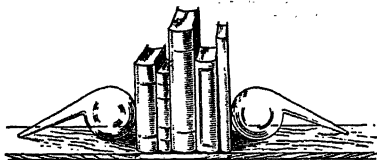
brought into operation in 1949. One of these plants is the Commission-owned vanadium-uranium mill at Durango, Colorado, for which a lease is being arranged, while the other is a new plant to be erected by Vanadium in south-east Utah. Under terms of the tentative agreement the government-owned processing plant at Durango will be rehabilitated by the Vanadium Corporation at a cost to the company estimated to be more than \$200,000. It is anticipated that ore will be supplied principally by the corporation's mines and independent operators will be able to deliver ore under the terms of the Commission's ore purchasing programme.

* * *

Another new organic compound, called "Nopol" and described as a "bicyclic primary," has been developed by the Glidden Company, Cleveland, Ohio. Produced by condensation of beta pinene and formaldehyde, the new material is now available from pilot plant operations for experimentation and development. It is said to be the only primary alcohol derived from terpenes potentially available in large quantities and at low cost.

* * *

United States production levels of industrially important inorganic chemicals for August, 1948, were generally higher than for July or for August, 1947, according to the U.S. Bureau of the Census. Increases from July, 1948, quantities were reported by the bureau for 24 of the 35 chemicals included in the continuous survey, while decreases were reported for only 11. A comparison of August, 1948, quantities with those for the same month a year ago also shows greater production for 24 and declines for 11 chemicals. Record high production was reported in August for carbon dioxide (liquid and gas, 26.9 million lb.; "dry ice," 93.8 million lb.); chlorine (142,412 short tons), hydrogen (2402 million cu. ft.), and caustic soda. Compared with the previous month's totals, production gains were also reported for such "heavy volume" chemicals as ammonium nitrate, hydrochloric acid, oxygen, phosphoric acid, the sodium phosphates, sodium sulphates, and sulphuric acid. Reductions during the month occurred for synthetic ammonia, synthetic ammonium sulphate, nitric acid, and soda ash. The relative decrease was particularly large only in the case of synthetic ammonium sulphate (July, 27.8 million lb.; August, 14.2 million lb.).



A CHEMIST'S BOOKSHELF

Molybdenum, Steels, Irons, Alloys. By R. S. Archer, J. Z. Briggs, C. M. Leeb, Jr. Published by the Climax Molybdenum Company of Europe, Ltd., London, E.C.3. Pp. 394.

Molybdenum, first isolated by Hjelm in 1790, was still classed as a rare metal in 1915. The development of the ore deposits at Climax, Colorado, from 1917, assured the iron and steel industry, for the first time, of an adequate commercial supply. By that time the use of the other alloying elements was already well established. The introduction of molybdenum often meant replacement of part or all of some of these other elements. Its acceptance by the industry therefore clearly demonstrates its metallurgical, industrial and economic value. The characteristic advantages gained from molybdenum are so marked, that today a large proportion of the world's alloy steel and cast iron production contains molybdenum as an essential ingredient. This and the growing demand for molybdenum, accentuated by war demands, confers a peculiar importance to this book.

Of its 10 sections, the first and second deal with the fundamental and technical effects of molybdenum and Section 3 describes concisely the addition of molybdenum to iron and steel, which can be made in the form of the oxide, which is easily reduced, or as ferro-molybdenum or scrap, containing the metal. Sections 4 to 7 reflect the application of molybdenum for wrought alloy engineering steels, wrought resistant steels, wrought steels for elevated temperature service and for tool steels. Section 8 deals with steel castings which can be divided into the same classifications as wrought steels. Section 9 is devoted to the extensive use of molybdenum for cast irons, divided into the three groups: grey, white and malleable, and the last section indicates a large number of special purpose and non-ferrous alloys that contain molybdenum as an essential constituent.

Molybdenum's versatility as an alloying element is nowhere better shown than in these alloys where it is widely used and contributes added corrosion resistance, elevated temperature strength, hardening, resistivity or some other desired property depending upon the type of base alloys. A good deal of the rest of the book discusses

practice needs and contains a wealth of items related to the essentials of the subject.

Appendices A to L of the book are devoted to determination methods, hardening tests, tabulated chemical composition ranges, analysis and physical properties of molybdenum, etc. They make the book almost encyclopaedic, in conjunction with the abundant bibliography and references and some hundreds of tables, diagrams and figures. The index alone covers 24 pages.

The Chemical Industry and its By-Products (Die Chemische Industrie und ihre Nebenprodukte). Third Edition. 1947. Verlag für Wirtschaftsliteratur G.m.b.H., Zürich 3, Burstwiesenstrasse 53. Pp.232.

The book is a directory of Swiss manufacturers of chemical products of commercial and purer grades. A foreword by the president of the Swiss Chemical Association outlines the scope and present development of the chemical industry, which is kept up-to-date in spite of the fact that foreign currency is short and the country is lacking in many necessary raw materials. Yet there are more than 650 firms engaged in this industrial field and the advance of the chemical industry is mainly due to new processes and new products constantly devised and developed. Recent discoveries and new applications of old knowledge are stated to be opening many new vistas. The catalogue shows that the Swiss chemical industry is keeping abreast of all developments of applied chemistry and maintains close contacts with primary research at home and abroad. The book therefore presents an accurate and complete picture of the activities and achievements of the Swiss industry. It is divided into 17 chapters classified according to the manifold products, with proprietary, trade names and trade marks. It should be of considerable help in fostering international trade relations.

Newsprint for Australia.—A deal has been arranged by Bowaters to convert into newsprint for export to Australia 25,000 cords of Canadian logs and 4500 long tons of Canadian sulphite pulp. This will make 29,500 long tons of finished paper, paid for with dollars originally allotted to purchase finished newsprint.

Home News Items

Sudanese Gum Arabic.—Only the purest gum arabic from the Sudan is used in the making of British postage stamps, states the *Post Office News Bulletin*, and almost every week there is some suggestion from the public that flavouring should be added.

Change of Address.—The Disposals Section of the Ministry of Supply Non-Ferrous Metals Directorate has moved to 66/72 Gower Street, London, W.C.2. (Telephone: MUSEum 8044.) Telegraphic address: Metrol, Westcent, London.

Canadian Metals for Britain.—Provision has been made through ECA, in Washington, for Britain, to purchase in Canada aluminium, copper, zinc and lead valued at Can. \$33.4 million. Of the total authorisation for purchases of all commodities obtainable from Canada for countries participating in ERP, Britain has been allocated 89 per cent. (*Foreign Trade*, October 2.)

Two Welsh Pits to Close.—Because of the low production, the Steer and East pits at Gwaun-Cae-Gurwen collieries at Ammanford, South Wales are to be closed, and workers given a month's notice. The Wales Regional Coal Board state that since a dispute over an umpire's award on October 25, output per manshift had dropped from 11.67 cwt. to only 6.5 cwt. The two pits had lost £596,435 in the half year ended June 30.

Operational Research Club.—As a result of informal meetings at the Royal Society between those interested in the development and application of research, an Operational Research Club has now been formed. Membership is limited to retain the original nature of the meetings, but will include representatives from the operational research teams working in industrial and other civil fields, together with some from the defence services.

New Export Facilities.—Beck and Pollitzer, Ltd., shipping and forwarding agents, announce that a new export packing works, with special facilities for handling machinery, is to be opened at Bailey Road, Trafford Park Trading Estate, Manchester, on Wednesday next (October 10). The company has also extended its activities in South Africa by the formation of Beck and Pollitzer (Africa) (Pty.), Ltd., with a head office at 3 Yorkshire House, First Floor, Marshall and Rissik Streets, Johannesburg.

Viteolin Capsules.—Glaxo Laboratories, Ltd., announces that viteolin capsules are now withdrawn from the market and no further stocks are available.

Health Minister at Glaxo.—Mr. Aneurin Bevan, Minister of Health, recently visited Glaxo Laboratories, Ltd., at Greenford, Middlesex, to see streptomycin being filled and packed. He was received by Sir Harry Jephcott and other directors, and spent some time watching the drug being filled into vials ready for distribution.

Prices of Oils and Fats.—The Ministry of Food announces that the only change in the prices of unrefined oils and fats and technical animal fats allocated to primary wholesalers and large trade users during the four-week period ending November 27, is a reduction in the price of sunflower acid oil from £92 per ton to £58 per ton naked ex works.

Research College for Foundry Workers.—The foundry, research rooms and laboratories of the National Foundry College were opened to the Press this week. A few students have begun training, but the official opening is planned for next January. The college provides a two-year course of university standard which is the most advanced training available for the foundry industry.

Manilla Gum Copal Prices.—The Board of Trade announces that the selling prices of manilla gum copal have been reduced as from November 1. The revised prices will be as follows: L.W.S. grade, £158; Soft mixed, £138; Loba C.N.E., £120; Loba mixed, £159; Copal chips, £125. This material is administered by the Director of Sundry Materials, Board of Trade, 10 Old Jewry, London, E.C.2.

Winter Plans for Power Supply.—To meet the demands of electricity load-spreading during the coming winter nearly all the big undertakings in Liverpool have made plans for shifting times of chief demand and augmenting independent supplies. The Dunlop Rubber Company, a typical example, is confining use of some heavy plant, chiefly mixing plant, to night shift, and is bringing into operation its own diesel electric plant. One of the firm's problems is that it is still expanding. "We now employ 6,600 workers and so cannot use less electricity," it was stated by the management in Liverpool.

Personal

Six new Fellows have been elected by the Textile Institute. They are: DR. B. P. RIDGE, head of the Field Research section of Fibres Development department, Imperial Chemical Industries, Ltd., who is well-known for his work on synthetic fibres; DR. M. K. SEN, senior physicist of the Indian Jute Mills Association Research Institute, Calcutta, who studied at Leeds University in 1945, and has published considerable work on textiles both in England and India; MR. C. DIAMOND, chief technical manager (acetate and fibre processes), Courtaulds, Ltd.; MR. C. W. NORTH, strong yarn department at British Celanese, Ltd.; MR. FRANK BROCK, Isaac Holden Sons, Ltd., and MR. A. R. GEARY, principal of the Lander Technical School, Fife. MR. JOHN LAIRD HENDRY, of Durban, South Africa, now studying at Leeds University, has been elected an Associate of the institute.

A commission of three scientists to visit the Gold Coast and report on steps necessary to overcome the swollen shoot disease of cocoa trees has been appointed by the Secretary of State for the Colonies. The members are: DR. G. BARKELEY, Dominion Laboratory of Plant Pathology, Canada; DR. W. CARTER, head of the department of entomology, Pineapple Research Institute, Hawaii, and PROF. VAN SLOTEREN, of Holland.

MR. N. L. ALLPORT has resigned from the scientific staff of The British Drug Houses, Ltd., with effect from October 29, and, as from January 1, 1949, will be taking over the practice of DR. D. C. GARRATT, consulting analyst, at 325 Kennington Road, London, S.E.11.

MR. WALTER NELLIES, O.B.E., J.P., is retiring at the end of the year from the position of general secretary of the National Union of Shale Miners and Oil Workers. He has been the Union's only secretary for 27 years.

MR. BRINLEY JONES has resigned his position as senior metallurgist in the metallurgical and research department, Vickers Works, of English Steel Corporation, Ltd., to join Climax Molybdenum Company of Europe, Ltd., as manager.

CAPTAIN JOHN MORRIS GATHERAL, who has died at Penton, Cumberland, aged 71, was formerly a chemical manufacturer on Tyneside and at Glasgow. He had been a member of Cumberland and Northumberland County and Rural Councils.

New Light-Weight Concrete

NEW light-weight types of concrete, weighing from one-sixth to one-third as much as ordinary concrete, are being developed in the U.S.A. to provide a wider range of specialised materials that may reduce domestic building costs. The U.S. National Bureau of Standards, Washington, D.C., which has been testing the new materials, says that they have two major advantages over traditional concrete: they eliminate much deadweight and provide better insulation against sound and extremes of temperature. Certain types of light-weight concrete can be sawed and nailed together like wood, it is claimed.

In the new products, various minerals—such as perlite, vermiculite, pumice, foamed slag, clay, slate and shale—are substituted for sand, gravel or crushed rock used in ordinary concrete. Officials of the bureau say that while these light-weight concretes are not strong enough for use on pavements or roadways, they have proved superior for many special construction purposes such as roofing and interior walls.

Japanese Recovery

PROSPECTS for the chemical industry in Japan show a gradual improvement and, according to recent reports, a total of nearly yen 97 million has been authorised to be borrowed or spent between four firms, for repair or improvement of their plant and production.

In research, the Japanese Institute of Scientific and Industrial Research of Osaka, established in 1939 to carry out work on problems related to industry, now has over 150 workers. Dr. T. Ao, director of the institute, recently announced the successful operation of a pilot plant for the production of ephedrine.

Other projects under consideration at the institute include: setting up of a pilot plant utilising new techniques of vacuum distillation for making vitamin A; studies on catalysts for the hydrogenation of vegetable and animal oils; the hydrogenation of paraldehyde; the synthesis of heterocyclic compounds and their derivatives, and cellulose fermentation and investigation of electrolytic condensers.

"Benzol—How It's Chlorinated" is the title of a four-page reprint now ready for free distribution by the Glyco Products, Co., Inc., Brooklyn, New York. This includes a flow-sheet describing the process for making and purifying mono-, ortho- and paradichlorobenzols and hydrochloric acids.

Overseas News Items

12 Million Volts.—Massachusetts Institute of Technology announced last week the construction of a 12 million volt electrostatic generator designed to carry the science of nuclear fission into new realms.

China to Have Aluminium Industry?—Bauxite deposits which have recently been discovered in the Fukien Province of China are stated to be a valuable basis for the establishment of an aluminium industry. Before the war China imported bauxite chiefly from Indo-China, which is still the major supplier.

Dearer Lead in America.—Lead prices were raised by 2c per lb. on November 1 by the American Smelting and Refining Company and the St. Joseph Lead Company. This brought the price to a new record level of 21.50c. at New York. The Consolidated Mining and Smelting Company of Canada has also raised its lead price to 20½c. per lb., an increase of 2c. per lb.

"Atom City" in U.S.S.R.?—A former Russian official, Mr. Kirill Alekseev, stated in an interview over the Mutual Broadcasting System of America that Russia is carrying out atomic bomb research in a city to which he referred as "Atomgrad." He claimed that a population of some 400,000 people, mostly political prisoners sentenced to forced labour, lived and worked there, mainly in underground homes and factories.

New Programme of Swiss Chemical Works.—The Holzverzuckerungs A.G., Domat/Embs, which was very active during the war, when it supplied a mixed motor fuel to replace imported petrol, refers in its report to a further reduction of this business and difficulty in keeping its plant fully occupied, which can be overcome only by the carrying out conversion to a new manufacturing programme. The most important process taken up during 1947 was production of formaldehyde supplied principally to makers of plastics.

Oil Drilling in Austria.—Reports from Austria reveal that much exploratory drilling is going on in the Zistersdorf oil field in the Vienna Basin. In addition, the French have carried out exploratory activities in the area of Lake Constance, but no results have been made public. Another recently mentioned deposit is in the U.S. zone at Taufkirchen, where daily output amounts to 250 to 500 kgs. Further deposits are believed to occur between Salzburg and the Enns River in the U.S. zone. It is also stated that oil occurs near Graz, Styria, in the British zone.

Wattle Bark Exports from S.A.—The United Kingdom was the principal recipient of large shipments of wattle bark extract made from South Africa during August. Exports of bark were also satisfactory, the chief markets being Japan, Europe and the U.S.

Malayan Bauxite Development.—The Malayan bauxite deposits, which were extensively worked during the war by the Japanese, are likely to be exploited on a large scale by British Australian and Canadian interests. Areas hitherto unexplored are being surveyed.

U.S. Rubber Consumption.—Consumption of new rubber in the U.S.A. during September was estimated at 90,214 long tons, according to the monthly report of the Rubber Manufacturers' Association, Inc., New York. This was a reduction of 2.19 per cent from the August figure. Natural rubber represented 51,400 tons, and synthetic rubber 38,814 tons.

Platinum Prospects in South Africa.—The Union Platinum Company announces that during the September quarter 2025 ft. sampled proved 100 per cent payable, with average values of 7.6 dwts platinum over 22 in., or 167 inch-dwts. The last estimate of available ore reserves gave 250,000 tons oxide ore and 89,000 tons sulphide averaging 6.3 dwts. of platinum metals per ton. The reduction plant is expected to be in operation at the end of this month.

N.Z. Wood Pulp Factory.—What is stated to be New Zealand's first wood pulp factory, at present under construction at Maraetai near Auckland, is to start operations in 1950 with an initial output of 10,000 tons per annum. The pulp is to be used both in New Zealand and in Australia for the manufacture of kraft paper. In addition, plans are under consideration for the erection of State-owned pulp plants at Murupara, near Auckland, in 1952.

Glass Commission Changes.—Decision to revise the constitution of the International Commission on Glass were made when its first post-war meeting was held recently at Sheffield and Buxton. Until the changes become effective, Prof. W. E. S. Turner and Dr. B. P. Dudding (Great Britain) are respectively president and honorary secretary, while the following countries are represented among the other members: Belgium, Czechoslovakia, Denmark, France, Germany, Holland, India, Spain, Sweden and the United States.

Next Week's Events

MONDAY, NOVEMBER 8

The Chemical Society (Eire) University College, Cork. Prof. H. J. Emeléus: "Production and Uses of Radioactive Tracers."

Manchester Federation of Scientific Societies. Society of Instrument Technology. College of Technology, Manchester, 7.30 p.m. J. K. Burkitt: "A Proposed System of Instrumentation Symbols."

Hull Chemical and Engineering Society, Royal Station Hotel (joint meeting with Hull and district section of the Royal Institute of Chemistry) 7.30 p.m. J. P. Baxter: "Some Compounds of Carbon and Fluorine."

Institute of Metals (Scottish local section) Institution of Engineers and Shipbuilders in Scotland, 39 Elmbank Crescent, Glasgow. 6.30 p.m. F. E. Stokeld: "Forging and Stamping Non-Ferrous Metals."

TUESDAY, NOVEMBER 9

Chemical Engineering Group (S.C.I.). Burlington House, London, W.1. 5.30 p.m. A. D. Davidson: "Heat Transfer."

Sir Halley Stewart Trust. Memorial Hall, Farringdon Street, E.C. 6 p.m. R. F. Harrod: "The Atomic Age. III—Economic Recursions of Atomic Power."

Textile Institute (Yorkshire section). Midland Hotel, Bradford. 7 p.m. W. H. Hillier: "The Treatment of Sewage Containing Textile Effluent."

Chemical Society of Leicester. University College. 5.30 p.m. H. J. T. Ellingham: "Chemical Affinity."

WEDNESDAY, NOVEMBER 10

Society of Chemical Industry (Food group) Conversazione, United Dairies, Ltd., Laboratories, London W.12.

The Chemical Society (Liverpool). University 4.30 p.m. Prof. M. Stacey: "The Chemistry of Some Carbohydrate Constituents of Bacteria."

Society of Dyers and Colourists (Nottingham). Victoria Station Hotel, 7 p.m. Dr. R. G. Fargher: "Recent Advances in Cotton Bleaching."

THURSDAY, NOVEMBER 11

The Royal Society, Burlington House, London, W.1. 4.30 p.m. R. M. Goody: "The Thermal Equilibrium at the Tropopause and the Temperature of the Lower Stratosphere." S. Chapman and K. K. Tschu: "The Luna Atmosphere Tide at 27 Stations Widely Distributed over the Globe."

The Chemical Society, Burlington House, London, W.1. 7 p.m. Tilden lecture: Prof. C. E. H. Bawn: "The Structure and Reactivity of Free Radicals."

Manchester Federation of Scientific Societies. Chemical Society, University,

Manchester. 6.30 p.m. Reading of short papers. Pharmaceutical Society. St. Mary's Hospital. 7.45 p.m. D. G. Ardley: "Some Recent Advances in Drug Therapy."

Society of Chemical Industry (Liverpool and North-western area). University of Liverpool. 6.30 p.m. Dr. Inglis: "A Review of Steels Used in Chemical Industry." S.C.I. (and BAC) Derby, St. James's Restaurant. 7.15 p.m. Dr. Jenkins: "Prevention of River Pollution."

FRIDAY, NOVEMBER 12

Royal Statistical Society (London group). Industrial Applications section. W. J. Jennett: "Control Charts and Associated Techniques."

Sir John Cass Technical Institute (Department of Chemistry). Jewry Street, Aldgate. E.C.3. 6 p.m. R. N. Reavell: "Lead and Its Alloys."

SATURDAY, NOVEMBER 13

British Interplanetary Society. St. Martin's School, 107 Charing Cross Road, W.C.2. 6 p.m. H. E. Ross: "Orbital Bases."

Royal Institute of Chemistry (Reading) University. 3 p.m. A symposium "Radioactive Tracer Elements."

MOLECULAR CRYSTAL GAZER

A NEW electronic research tool designed to provide molecular information about samples weighing as little as 1-28 millionths of an ounce, by investigating atomic architecture of crystal structures has been developed by engineers of the Radio Corporation of America. Called a "Molecular Crystal Gazer," the new unit is expected to find use in investigating corrosion, catalysts, lubricants, surface deposits, pigments for paints, inks and dyes, and in many other phases of metallurgy.

Technically, according to company engineers, the instrument probes the structure of crystalline substances by directing a beam of electrons through a minute specimen, producing diffraction patterns on a fluorescent plate or from a photographic print.

Italy's First Oil Pipe-Line.—Work is to commence next Spring on the construction of Italy's first oil pipe-line—from Legnò, near the oil port of Vado Ligure, via Alessandria to Treccate on the east bank of the Ticino River, where Italy's largest and most up to date oil refinery is to be erected. Preparatory work is in progress on the site. The pipe-line is to be extended later to Milan, Turin and possibly to Switzerland.

New Companies Registered

Accumulator Patent Holdings, Ltd. (459,045).—Private company. Capital £3000. To acquire the rights in certain countries of the Dry Accumulator Co., Ltd. and Edmund W. Sudlow and Leonard Fuller in certain inventions relating to electrical accumulators; and to act as manufacturers of electrical accumulators, batteries, acids and containers, etc. Directors: Edmund W. Sudlow and Dr. Hugh C. Fuller. Solicitors: Gouldens, 16 Byward Street, E.C.3.

Alkyl Aryl Chemicals Ltd. (459,975).—Private company. Capital £100. Manufacturers of chemicals and manures, etc. Directors: J. F. O'Brien and E. Biddlecombe, Solrs.: Linklaters & Paines, 6 Austin Friars, E.C.2.

Chemical Engineers (Glasgow), Ltd. (26,604).—Private company. Capital £2000. Manufacturers of chemical, engineering, scientific and surgical machinery and instruments. Subscribers: H. Winning, Jr., The Croft, Kilmacolum, Renfrewshire, and S. A. J. Murray. Reg. office: 31 Townsend Street, Glasgow, C.4.

F. D. Copeland & Sons, Ltd. (460,389).—Private company. Capital £1000. To acquire the business of importers and exporters of all natural essential oils carried on by F. D. Copeland & Sons, 275 Baring Road, S.E.12. Directors: F. D. Copeland, Mrs. Copeland, and R. C. Wilkie. Reg. office: 275 Baring Road, Grove Park, S.E.12.

Crystal-Brite Products, Ltd. (460,430).—Private company. Capital £1000. Manufacturers of abrasives, detergents, oils, chemicals, etc. Directors: A. W. Ayres, Mrs. W. R. Ayres, and D. H. Norris. Reg. office: 32 Great Windmill Street, W.1.

East Anglia Plastics, Ltd. (459,738).—Private company. Capital £20,000. To acquire the business of manufacturers of and dealers in plastic materials carried on at Darlington by East Anglia Chemical Co., Ltd. Directors: T. C. Usher (director of East Anglia Chemical Co., Ltd.) and C. G. Moore. Reg. office: Street One, Aycliffe, Darlington.

Elcontrol, Ltd. (460,270).—Private company. Capital £3000. Manufacturers of electro-mechanical recording and controlling devices. Reg. office: The Clock House, 7 Arundel Street, W.C.2.

Enesco Scientific Glassware, Ltd. (460,386).—Private company. Capital £500. Laboratory furnishers and proprietors, chemical engineers, etc. Directors: J. A. Davis, 12 High Street, Penge, S.E.20; and A. F. M. Batchelor.

Midland Direct Supplies (1948), Ltd. (460,218).—Private company. Capital £3000. Objects: To acquire the business of Notts. Direct Distributors, Ltd., and Midland Direct Supplies, Ltd. Manufacturers of chemicals, gases, oils, etc. Directors: J. P. Shaw, Ada Shaw, R. Blackmore and G. Smith. Reg. office: 17 Village Street, Derby.

Southern Humus, Ltd. (460,312).—Private company. Capital £1000. Manufacturers of manures, fertilisers, chemicals, gases, etc. Directors: B. P. Cook, and S. Marian. Reg. office: 8 The Drive, Hove, 3.

Company News

Societa Anonima Italiana Ciba, Milan, the Italian subsidiary of Ciba, Ltd., (pharmaceutical products, chemicals and dyestuffs) has increased its share capital from 6 to 200 million lire.

Chemical and Allied Stocks and Shares

INTERNATIONAL news, the U.S. elections and implications of the Steel Bill have all made for caution in stock markets. Iron and steel shares provided the only really active section, and generally prices have been quite well maintained on balance in the absence of selling. The City regards as extremely unfair that take-over values for iron and steel nationalisation are based on share prices and not assets values of the companies.

The nationalisation threat, dividend limitation and the Bonus Tax have all combined since the war to keep down share prices. Compensation based on assets values would have taken a long while to assess, and because of this share prices are being taken as the yardstick in the hope that it may be possible to effect the "take-over" of the industry by May 1, 1950. The Government then plans to exchange shares into British Steel stock on the basis of the take-over prices of individual shares and the values then ruling for British Funds.

Steel shares are now, in effect, a means of acquiring a long-term interest in British Funds, and as such may tend to attract a good deal of attention. Their estimated take-over values will mean that there is very little danger of a fall in market values below current levels.

Current market values are mostly slightly below take-over prices, due to the fact that

buyers naturally have to pay the usual stamp and brokerage expenses. In some instances prices are well below take-over, but this is only temporary and arises from the fact that there has been selling of some shares which recently attracted a good deal of buying on the hope that nationalisation "compensation" would be made on an assets value basis.

Staveley shares, for instance, are quoted at 88s. 9d. at the time of writing, although the "take-over" is 90s. 8d. Indeed, there was considerable surprise that not only the Staveley company itself, but also its subsidiary, the Staveley Iron & Chemical Company, are to be absorbed.

A feature has been a general rise in shares of iron, steel and allied companies not being taken over, notably Vickers, Cammell Laird, Baldwins, and John Brown. English Steel Corporation (controlled by Vickers and Cammell Laird) is being taken over, but the shares not being quoted, their valuation for this purpose will be a matter of arbitration.

There has been some switching from iron and steels into leading industrials, but so far this has not been sufficient to affect prices. Leading chemical shares have been relatively firm with Imperial Chemical at 47s. 7½d., Monsanto Chemicals 60s., Laporte 5s. units 21s. 6d., Fisons 59s., W. J. Bush 82s. 6d., Albright & Wilson 5s. ordinary 30s. 3d., and Amber Chemical 2s. shares 9s. 6d. The 4s. units of the Distillers Co. were 28s. 7½d., British Plaster Board rallied moderately to 22s. 6d., Glaxo Laboratories were £18½ and Turner & Newall changed hands around 77s. 6d., United Molasses have been steady at 47s. 9d., and Tube Investments at £6½ were little changed, although there was general satisfaction that the latter company is not to be nationalised. Stewarts & Lloyds, however, is scheduled for nationalisation and the deferred units are quoted at 56s. 9d. at the time of writing, compared with the estimated take-over value of 57s. 4d.

Elsewhere, British Glues & Chemicals 4s. shares were 20s., British Oxygen firmed up to £5, Borax Consolidated were 63s. and British Aluminium 47s. 6d. Boots Drug remained firm at 55s., British Drug 5s. ordinary were 9s. 3d., but, following full details of the Anglo-Dutch tax agreement, Lever N.V. came back to 51s. 3d. although Lever & Unilever firmed up to 50s. 6d. Oils receded, Anglo-Iranian to £8½ and Burmah Oil to 70s. 7½d., while Shell were 75s. 7½d. and, awaiting the results, Trinidad Leaseholds 5s. units were 31s. 4½d.

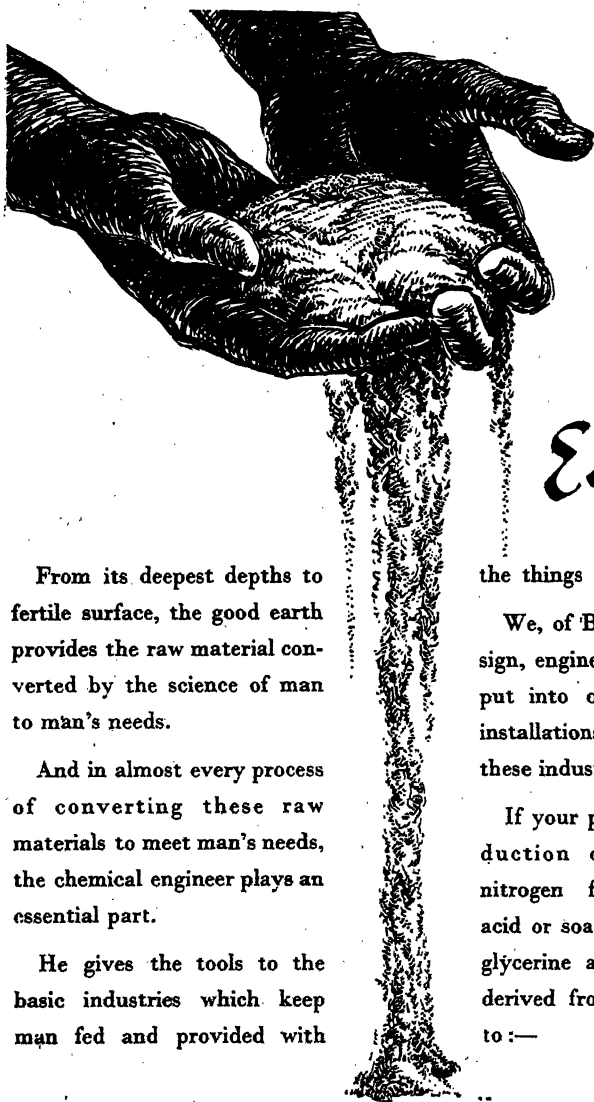
British Chemical Prices

Market Reports

FIRM price conditions operate in most sections of the industrial chemicals market and the demand generally is sustained at recent levels. There has been little alteration in the supply position which, on the whole, is reasonably satisfactory in view of the high rate of intake of the home consuming industries. Inquiries for export continue on a fairly substantial scale and items prominent in this respect are disinfectants, dyestuffs and fine chemicals. Among the soda products there has been an active market for caustic soda, both for home and export, chlorate of soda, sulphide of soda and yellow prussiate of soda. All the potash chemicals are finding ready buyers at firm rates. The call for the red and white leads remains strong at the recently increased prices. Formaldehyde is in good demand and acetic acid supplies are fully absorbed at controlled rates. A steady market characterises the trade in coal tar products and the demand for both home and overseas destinations remains more or less unchanged.

MANCHESTER.—The chemical market has continued active during the past week from the point of view of home-trade deliveries, and specifications against orders already placed are circulating freely. Replacement buying from the textile and allied trades has also been on steady lines, and new business on account of other industrial users has been on a fair scale. A fair number of inquiries for shippers have been reported during the past few days, covering a wide range of products. There is a steady demand for the leading fertiliser materials, and in the tar products market a ready outlet is being found for most of the leading classes, light and heavy.

GLASGOW.—The increased turnover noted during the past few weeks continued last week in the Scottish chemical market. Demand was widely distributed, all industrial chemicals having been fairly well absorbed, and demands were fully met. The main shortage has been calcium chloride, and this shortage is likely to be accentuated during the coming winter months. It has been very noticeable that the artificial demand for light soda ash which was created when the material was being rationed has disappeared since the rationing finished some weeks ago. In the export market there has been a temporary loss of orders from the Argentine, due to the Argentinian exchange permit position; otherwise conditions are unchanged.



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Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2. at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Regeneration of contact particles.—J. C. Arnold. (Standard Oil Development Co.) April 10, 1945. 608,859.

Plasticised compositions and process for preparing the same.—Firestone Tyre & Rubber Co. April 1, 1944. 608,947.

Electrolytic recording electrode.—Faximile, Inc. Sept. 11, 1941. 608,953.

Polymerisation of organo-siloxanes.—Corning Glass Works. Oct. 3, 1944. 608,955.

Organo-silicon compositions and methods of making them.—Corning Glass Works. Oct. 3, 1944. 608,956.

Weld rods for depositing hard metallic layers on the surface of metallic pieces.—Soc. d'Electro-Chimie, d'Electro-Metallurgie et des Acieries Electriques d'Ugine. Oct. 8, 1943. 608,957.

Installation and process for treating dust-containing mixtures of substances of different densities.—F. Poitte. July 1, 1944. 609,029.

Sintered bodies for direct welding to metal parts.—Brown, Boveri & Cie, A.G. Oct. 5, 1944. 609,030.

Apparatus for projecting thermal or visible or ultraviolet radiation.—G. Roth. Sept. 21, 1945. 608,864.

Cyanine dyes containing a carbonyl or thiocarbonyl substituent in the methine-chain and photographic silver halide emulsions sensitised therewith.—General Aniline & Film Corporation. Oct. 17, 1944. 609,033.

Pressure-welding process and articles produced thereby.—Soc. Anon. Tubix. Nov. 21, 1944. 609,035.

Process and apparatus for dividing a liquid.—De Directie Van de Staatsmijnen in Limberg. Dec. 23, 1943. 608,876.

Manufacture of azo-dyestuffs capable of being chromed.—J. R. Geigy A.G. Dec. 21, 1944. 609,039.

Aqueous non-alcoholic vanillin-containing flavoured composition.—Salvo Chemical Corporation. Jan. 25, 1945. 608,771.

Detection of suspended matter in fluids.—Specialities Development Corporation. Dec. 22, 1944. 608,772.

Process for the production of condensation products from 1:8-naphthosultone, and the resulting products.—J. R. Geigy A.G. Dec. 12, 1944. 609,040.

Apparatus for crimping or corrugating strip or sheet material.—I.C.I., Ltd., and A. F. Dyson. Dec. 21, 1945. 608,775.

Valve device for heating and/or ventilating purposes.—I.C.I., Ltd., and R. W. Sturges. Jan. 16, 1946. 608,968.

Thermostatic electric control devices.—Wilcolator Co. March 15, 1944. 608,879.

Mechanisms for applying liquids to sheets.—Block & Anderson, Ltd., and H. Gerlach. Jan. 28, 1946. 608,785.

Process for the stabilisation of hydrogen cyanide.—A. Sporzynski. Feb. 11, 1946. 608,885.

Oxygen cutting-machines.—L. J. Hancock, and W. F. Cumber. Feb. 12, 1946. 608,886.

Process for pasting halogen-containing polymerisation products on surfaces.—N.V. De Bataafsche Petroleum Maatschappij. May 2, 1945. 608,893.

Manufacture of tris-azo-dystuffs.—Ciba, Ltd. Feb. 27, 1945. 608,897.

Basic refractory products, in particular, basic refractory linings for furnaces and parts of furnaces, and a process for obtaining them.—Commentary Fourchambault et Decazeville. Feb. 19, 1943. 608,790.

Electrolytic production of light metals.—E. I. Du Pont de Nemours & Co. March 1, 1945. 608,805.

Production of chlorinated trimethyl acetone.—E. I. Du Pont de Nemours & Co. March 2, 1945. 608,806.

Copolymers of halogenated ethylenes.—E. I. Du Pont de Nemours & Co. March 1, 1945. 608,807.

Sealing devices for centrifugal separators.—A/B Separator. March 2, 1945. 608,808.

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Agricultural Chemistry

IT is unlikely that there has ever been a period in this country's history when so much effort, propaganda and admonition was devoted to the cause of raising industrial production. The subject has been canvassed, dissected and resurrected in so many connections that the force of the message is in danger of being dissipated through over repetition and the whole theme is beginning to assume a somewhat threadbare look. While that does not in the least diminish the bitter reality of the need, the continued insistence that only by such means can the standard of living here and in neighbouring countries of Europe be preserved must seem to some to reflect a somewhat restricted view of the true values. Most agricultural scientists are fully entitled to express that unorthodox view, as many have endeavoured to do lately; and it might be a good thing for humanity at large if they were as vociferous as the proponents of the industrial doctrine, by whom they will in any case always be outnumbered.

For at least a generation the relative abundance of agricultural yields, and not merely of the staple food crops, of great areas in North and South America has helped to disguise how insufficient are the total food resources which are now being measured more critically than ever before against the needs of the world. The facts are grim and readily ascertainable and the credentials of the authorities who have re-

presented them are at least as impressive as those of the majority who have preached the doctrine of salvation won by the processes of industry. Foremost among the former are Sir John Boyd Orr and Sir Henry Tizard, but neither has yet been able to command an audience as wide as that of which Sir Stafford Cripps, among others, is usually assured.

There is fortunately some comfort to be derived from the great activity which has been shown in the past few years by our own agricultural scientists, whose zeal has gone far to compensate for the inadequacy of their number. Bearing in mind Sir Henry Tizard's warning that no simple solution of the food problem can be expected from the processes of science alone, it is becoming increasingly evident that what is done in nearly all other directions must be guided by current scientific findings.

The measures that science is taking to investigate the problems of agriculture were summarised by Prof. S. J. Watson in an address to the Society of Chemical Industry recently. The work is devoted largely to the study of fundamental problems, often suggested by daily experience, into such subjects as the soil, the action of fertilisers, plant nutrition, grassland, and trace element deficiencies. Soil studies having as their aim the increase in the fertility of soil have already opened a vast province in which the soil chemist

On Other Pages

<i>Leader :</i>	<i>Cresylic Acid</i>	648
<i>Notes and Comments :</i>	<i>Gas Industry Exhibition</i>	648
<i>Standards for Plastics</i> ...	<i>Brazilian Explosives</i>	648
<i>Agricultural Chemistry</i> ...	<i>Developing Glass Fibre Products</i> ...	649
<i>The Nylon "Shuttle"</i> ...	<i>"Hall Mark" for Plastics</i> ...	650
<i>Fame Unsought</i>	<i>Copper Sulphate Declines</i>	650
<i>The Scale Model</i>	<i>Australia's Gift to BPI</i>	650
<i>The Salt Tax</i>	<i>Models for Process Experiments</i> ...	651
<i>Pakistan Seeks Immigrant Industries and Equipment</i>	<i>Research on Synthetic Oil from Coal</i>	652
<i>Industrial Controls Relaxed</i> ...	<i>Studies in Radioactivity</i>	653
<i>Improved Chemical Output and Stocks</i>	<i>The Safety Organisation</i>	656
<i>Price of Linseed Oil</i>	<i>Beilby Awards</i>	656
<i>Chilean Chemicals</i>	<i>Depreciation and Maintenance—III</i>	658
<i>Alkali Centre's 75th Anniversary</i> ...	<i>A Chemist's Bookshelf</i>	664
<i>Birth of an Industry</i>	<i>The Nobel Awards</i>	669
	<i>Parliamentary Topics</i>	669
	<i>Death of Former "Shell" Chairman</i>	669

has become caught up in the field of soil micro-biology. In the department of fertilisers the soil chemist has shown that both organic matter and chemical fertilisers are needed. The study of soil formation and of the chemistry of the organic compounds in soil is proceeding on fundamental lines. The main organic compounds in soil appear to be composed of lignin-like polymers together with a co-precipitated carbohydrate fraction. While this work is still in its infancy, considerable progress has been made and it may well exercise a vital influence on the maintenance and improvement of soil fertility all over the world.

On the subject of plant nutrition there arise such outstanding problems as the inter-relationship between phosphorus and the soil constituents which are likely to "fix" it and make it unavailable to the plant. The possibility that future generations may be faced with difficulty in securing supplies of phosphorus for the needs of the soil is not remote, since the known phosphorus deposits of the world are not inexhaustible.

It is probable that grasslands are the field in which most work is being done by the chemist. The scope here embraces improvement of fertility leading to better and more luxuriant growths, the conservation of green forage crops for winter use,

including artificial drying, in effecting which, it is interesting to note, more scientific principles are coming into use. The value of proper manuring, conservation by ensilage and artificial preservation are now all subjects of intensive research. The chemist is perhaps peculiarly interested in the effect of trace elements in the soil, particularly boron and manganese, and their effect on grazing stock. This knowledge is being applied on a steadily increasing scale by farmers in relatively enlightened parts of the globe. The majority of farmers still know little of this work and there remain vast areas in the world where husbandry of the most primitive kind continues and where central organisations staffed by scientists will be needed to produce even a gradual conversion.

The agricultural chemist therefore has not only to discover the fundamental facts but he has to spread the knowledge throughout the world. In view of the grave food position in these same areas and of the problems that are posed by increasing populations it may well be that the rôle of the chemist in agriculture will become the most vital of any in the many fields in which his participation is being sought. Recognition of that fact cannot come too soon.

NOTES AND COMMENTS

Standards for Plastics

A COMPELLING recommendation for the scheme publicly launched in London this week to provide for some plastics and moulding powders what is intended to become the equivalent of the "hallmark" is the effect which it is capable of having on overseas markets, where quality is becoming an increasingly powerful criterion as demand slackens. Underwritten by the British Standards Institution and the British Plastics Federation, the "Plastics Mark" now being made available by licence with appropriate quality safeguards promises to be a useful recommendation wherever a testimonial is required; the international reputation of the BSI in particular should carry weight. Acceptable as it is, what is now provided is only a beginning of what must be a protracted task of continually widening proportions if reliability of products is to be reasonably assured throughout the whole expanding field of plastics manufacture. At present, quality certification of raw materials is confined to urea formaldehyde and phenol formaldehyde. If other sources of plastics continue to multiply at the pace witnessed by the many formulations accepted during and since the war the committee formulating new standards will need to work fast.

The Nylon "Shuttle"

HOW doubtful may be the practical benefits of Government direction of new enterprises with a view to developing certain areas is illustrated by the case of the new mill built at Pontypool by British Nylon Spinners, Ltd. This is, of course, a private venture, costing between £6 and £8 millions, but the location of the plant was laid down by the Board of Trade, although a Midland site had previously been found by I.C.I. and Courtaulds at Banbury. The enforced use of the Monmouthshire location means that the nylon polymers from which the yarn is spun will have to be transported from the I.C.I. plant at Billingham across England to Pontypool, and finally yarns will have to be returned to hosiery factories in the Midlands. Surely here is a case where the advice of private enterprise could have been adopted to avoid increasing costs by unnecessary transporta-

tion, and aiding the spinning and manufacturing sides of the industry by having them situated in the same area. That would be the practical and economically the obvious course, but it is not the Government's.

Fame Unsought

THE Pharmaceutical Society, which has never sought public acclaim for itself or its activities, is showing a somewhat unexpected sensitiveness about the notoriety which is attaching itself to phenobarbitone. As a demonstration of the results of consistent publicity, the familiarity of the word phenobarbitone—not the commonest of drugs—wherever the BBC news bulletins are heard, with their customary appended warning that yet another package of the drug has gone astray, leaves no room for doubt. But the society feels that phenobarbitone, like those who administer it (provided they have not lost it) had better remain anonymous. Worst of all, the name of the drug is, according to the society, becoming the subject of music hall jokes. Therefore, in future broadcasts about loss of the drug the BBC should, it suggests, omit the name. The argument is, of course, eminently logical; the chances of recovery are not improved by specifying just what was in the container. But phenobarbitone has by now made such a name for itself by its vagrant habits that it is doubtful whether the general reaction represented by the familiar "What, again!" will be prevented by periphrasis when announcing that yet another prescription has gone the way of all phen . . . that is to say of hypnotics of a certain kind.

The Scale Model

MANY a process investigator must have wished that he were able to adjust process conditions more freely without risk of losses of material. The answer to the problem seems to be the use of experimental models—either of laboratory or pilot scale. Then admittedly new difficulties arise in the design of the model and the experiment, and in the interpretation of results. In certain cases there are simple criteria of similarity to use; work on frictional resistance to flow in pipes,

for example, can be carried out on almost any basis provided the designer maintains in the model and in the full-scale plant the same Reynolds number. When the scaling—up or down—of chemical reactions is the problem more complex considerations arise. It is then that a strong case exists for application of the criteria lately described by Mr. M. W. Thring in his paper to the Institution of Chemical Engineers on "The Construction of Models"—which is summarised on page 651 of this issue. In strong opposition no doubt will be found the "experienced muddlers-through" who consider that, whatever may have occurred in the laboratory, results on the plant will always be different. There seem, however, to be good prospects that Mr. Thring's theoretical weapons can be a means of raising the efficiency of processes with minimal cost in wasted material, time and constructional effort. Although his is clearly a highly theoretical approach, the great practical and economic significance of the objective should gain him a respectful hearing.

The Salt Tax

THE temptation, apparently irresistible to present-day politicians, to tax a commodity because it is necessary and cheap, is not altogether new. The history of salt, as recalled in an article in the *I.C.I. Magazine* for November, is a melancholy reminder that it is always easier to increase a tax than abolish it. At one time—in 1805—when salt itself was only about £1 a ton, the tax was £30 a ton. Even the present exorbitant levies on whisky and tobacco do not show such a contrast between tax and value. When that tax was abolished—in 1825—Great Britain enjoyed the happy distinction of being the first country in Europe to have tax-free salt. How fruitful that was in fostering some sections of the country's growing chemical industry at that date was reflected in the great development in alkali chemistry. Now, it seems, the tide has turned in no uncertain manner, so that we look forward in the near future to be acclaimed—or commiserated with—as a nation of the heaviest taxpayers.

Pakistan Seeks Immigrant Industries and Equipment

AT a Press conference held in London last week, Col. A. J. Beck, industrial adviser to the Government of Sind (Pakistan), gave some particulars of the measure of success already achieved by Government plans and assistance to encourage overseas manufacturers to develop factories in Pakistan. He said the number of factories in Pakistan (East and West) had now grown to some 400.

It was planned to establish a number of trading estates in Pakistan—the construction of eight or nine had been visualised—and development was being subsidised by the Pakistan Government, in addition to the proposed provision of the trading estates. Funds would be allocated for the purpose of purchasing plant, machinery, switch gear, etc., most of which was likely to be obtained from Britain, in the way such purchases used to be made by the Indian Government.

Pakistan, lacking steel, had had to design factory buildings mostly of reinforced concrete of a design very little seen in England, which was, however, suitable for many industries. One field in which there was much scope and good market prospects was metal utensils, particularly of aluminium.

Replying to a question by a representative of *THE CHEMICAL AGE*, Col. Beck said

there would be little or no opening in Pakistan for the manufacture or sale of artificial fertilisers. These were not popular with the natives, who argued that, if necessary, their land could produce three crops a year without artificial help; and that was a fact in well watered localities.

Answering another question, Col. Beck said one of the chemical commodities which were extremely scarce was sulphuric acid. Pakistan had one sulphuric acid plant in Karachi, and construction of a plant in Hyderabad (Sind) and another in Sukka was planned. These could not supply Pakistan's needs of acid, and he thought there was scope for overseas manufacturers to set up sulphuric acid plants in Pakistan.

The country also needed many of the other everyday chemical products—notably hydrochloric acid and chlorine—but as far as he knew there were no such chemical industries established in Pakistan. Recently they had been entirely without chlorine in Karachi with which to treat drinking water.

Col. Beck said there were fairly considerable deposits of lignite which, on analysis, had been found to have a very high sulphur content and were liable to spontaneous combustion. The site he had in mind, in Sind, could be developed by open-cast mining.

INDUSTRIAL CONTROLS RELAXED

Freer Conditions for Chemicals and Equipment

A CONSIDERABLE proportion of the controls dispensed with by the Board of Trade and the Ministry of Supply announced last week are of direct interest to the chemical industry.

Mr. Harold Wilson, President of the Board of Trade, giving details of the changes, said the relaxations were of three main kinds, of which the first arose from the increased supply of industrial materials manufactured here (particularly of some chemicals) which enabled the demand to be met.

Controls over manufacture of miscellaneous consumer goods came next, with the exception of (a) those which earned dollars and of which production was not yet sufficient, and (b) those goods manufactured from materials which directly or indirectly cost us hard currency.

Thirdly, where currency conditions allowed, in some raw materials, it was proposed to revert from public to private purchase.

Mr. Wilson said it was hoped that the reduction of controls would prove, to keen and efficient firms, an incentive to go ahead.

The withdrawal of 75 products effected by the Machinery, Plant and Appliances Orders was announced by the Ministry of Supply, Mr. G. R. Strauss. The Ministry, said Mr. Strauss, would still, however, continue to

advise manufacturers, in the national interest, on the best method of dividing output between home and overseas markets. Returns of production and export would still be required from manufacturers, and the system of steel allocation remained in force.

Machinery freed included:—Soap-making; emulsifying; filtration; glass-making and working; tabletting; working plastics; electroplating; drying; steam-generating; rubber working; mining and quarrying; cellulose film making; making briquetted fuels; candle-making; paint-making; water distillation; degreasing; centrifugal separating; weighing apparatus; industrial suction or pressure cleaning; furnaces; accumulators; foundry plant; water heating. These would all become effective as from December 1, 1948.

Relaxations or modifications announced by the Board of Trade coming into effect this month and next are shown in the table at the foot of the page.

Mobile Chemical Engineering Repairs.—

The newly registered company, Chemical Engineers (Glasgow), Ltd., with premises at 31 Townend Street, Glasgow, intends to operate a mobile repair service, working on the actual premises of the customer and carrying out rapidly essential repairs to allow continuity of production without the need to remove plant or replace it...

Item	Nature of relaxation (R.C.=Revocation of Control)	Statutory Order or Instrument affected
Acetates:		
Amyl acetate, butyl acetate, ethyl acetate	R.C. of acquisition, disposal, use, price	2195/46, S.I.584/48
Acetone	Ditto	Ditto
Amyl alcohol	R.C. of acquisition, disposal, and use	Ditto
Caustic potash, carbonate of potash ...	R.C. of consumption	55/41, 931/41
Cork	R.C. of use	193/42
Cotton linters	(a) Change from public to private purchase	1480/41
Cotton waste	(b) R.C. of acquisition	1422/42
Derris	R.C. of acquisition, disposal	51/42, 814/43, 815/43
Drying oils:	R.C. of acquisition, disposal, use	848/42
(Tung oil, stillingia, oiticica and dehydrated castor oil)	R.C. of acquisition, disposal, use; also on oiticica oil, a change from public to private purchase	1431/30, 1836/40
Dyestuffs	R.C. of obligation on producers and distributors of home-produced dyestuffs to register	21/40, 909/41, 1300/41, 539/40, 1850/42
Fertilisers	R.C. of production, distribution	2195/46, S.I. 584/48
Fusel oil	R.C. of acquisition, disposal, use, price	1176/45, 1994/46
Glassware	R.C. of manufacture, supply of certain domestic types	973/46
Glue, gelatine, size	R.C. of acquisition, disposal, use	
Hemp:		
Sisal, manilla	Change from public to private purchase	1496/47
Linoleum	R.C. of manufacture, supply	
Manilla copal	(a) Change from public to private purchase	1253/42
Methylated spirit	(b) R.C. of acquisition, disposal, use	2195/46, S.I.584/48
Rayon:	R.C. of acquisition, disposal, use, price	
Yarn and staple	Abolition of permits to deliver, operated by the Rayon Allocation Office of the Rayon industry	

Improved Chemical Output and Stocks

Principal Figures in August-September

THE number of persons employed in the chemical coke-oven and by-product works in August showed a small increase for the first time for some months, the total estimated figure being 241.5 thousand.

Production, on the whole, in August and September, showed an increase not only over the previous months but also over the figures for the corresponding period a year ago. These facts are revealed in the *Monthly Digest of Statistics* (No. 34, October, 1948), published by the Central Statisti-

cal Office, from which the following tables have been compiled.

Among the largest increases in output are pig iron and steel ingots and sulphuric acid and compound fertilisers.

Consumption of most commodities also has risen, while stocks have improved, as was indicated by the relaxation of controls announced by the Board of Trade. Some of the principal items are reproduced in the table below.

	August, 1948			August, 1947		
	Production	Thousand Tons Consumption	Stocks	Production	Thousand Tons Consumption	Stocks
Sulphuric acid	122.4*	—	61.9*	107.6*	118.0*	56.0*
Sulphur	129.2†	21.3*	32.6*	107.0†	17.6*	81.2*
Pyrites	—	16.5*	59.0*	—	14.9*	71.0*
Spent oxide	—	16.1*	161.3*	—	14.8*	155.2*
Molasses	6.8	28.2†	175.2	6.9	30.8†	137.2
Industrial alcohol (mil. bulk gal.) ...	1.92	1.88	8.81	2.07	2.15	5.48
Superphosphates	82.3	83.4	86.9	63.7	56.3	161.9
Compound fertiliser	135.8	96.4	174.5	105.0	68.5	141.5
Liming materials	—	319.2	—	—	223.9	—
Ammonia	—	6.45**	5.6	—	5.92	3.52
Phosphate rock (agricultural) ...	—	70.2	144.1	—	54.5	186.2
Phosphate rock (industrial) ...	—	7.66	22.0	—	5.57	35.8
Virgin aluminium	2.97	13.2	—	2.21	12.9	—
Magnesium	0.35	0.35	—	0.12	0.24	—
Virgin copper	—	26.4	115.1	—	26.7	102.3
Virgin zinc	—	15.7	61.3	—	16.7	34.4
Refined lead	—	14.2	26.0	—	16.9	42.2
Tin	—	1.69	17.2	—	1.89	17.0
Zinc concentrates	—	14.4	41.0	—	12.6	69.0
Pig iron	181.0*	—	278.0*	150.0*	—	323.0*
Steel ingots and castings (including alloys)	312.0*	—	—	279.0*	—	—
Rubber :						
Waste collected	—	0.23	8.6	0.03	1.34	52.0
Reclaimed	0.46	0.47	3.84	0.45	0.47	4.82
Natural	—	3.50	57.2‡	—	2.88	145.1
Synthetic	—	0.04	1.91	—	0.05	2.57

*September.

†Distilling only.

‡July.

§ Figs. after July, 1948 exclude government stocks

**5 weeks.

PRICE OF LINSEED OIL

THE reason for the present high price for purchase in bulk of linseed oil was questioned in the House of Commons recently by Mr. Bosson. He asked the Minister of Food if he was aware that the Government was now paying £185 per ton, where the price per ton in 1939 when purchased by private enterprise was only £22. Dr. Edith Summerskill, replying for Mr. Strachey, attributed the difference to the fall in supplies of animal and vegetable supplies throughout the world as a result of the war.

[Reports from Canada show that the visible supply of linseed oil is now 6.3 million bushels compared with 1.8 million bushels a year ago. With the carryover, there may be 10 million bushels for export.]

CHILEAN CHEMICALS

A NEW plant has been installed at Chuquibambilla for the production of copper sulphide ores at a cost of U.S. \$13 million. It is understood that the intention is to supplement the present output of oxide ores with sulphide ores, in view of the possible exhaustion of oxide.

The nitrate plant belonging to the Compania Salitrera Iquique at Taltal has been reopened after 15 years and is expected to produce about 4000 tons of nitrate monthly.

According to statistics published by the Banco Central de Chile, mining production in Chile for the half year January-June, 1948, are as follows: nitrate of soda 902,532; copper bars 210,098 tons; coal 1,112,462 tons; fine gold 2283 kilos.

ALKALI CENTRE'S 75TH ANNIVERSARY

I.C.I. Recalls Achievement of Brunner & Mond

THE Winnington works of Imperial Chemical Industries, Cheshire, one of the largest alkali-producers in the world, celebrates its 75th anniversary on November 20, when the first of 75 trees commemorating the occasion will be planted in the grounds of Winnington Hall, Northwich, by Lord McGowan, chairman of I.C.I., Ltd. Afterwards, a party of leading industrialists from this country and abroad, with representatives of the local authorities, local professional men and others, will join 250 of the works staff, foremen, workers and pensioners, at a luncheon.

Winnington Works was founded in 1873, and its early development was a result of the courage and business acumen of John Brunner, son of an Everton Unitarian minister and schoolmaster, and the genius of Ludwig Mond, the German chemist who came to this country in 1862 at the age of 23. They met at Widnes, where both worked for John Hutchinson & Co., alkali manufacturers. But Mond, gifted with great vision, found in the young accountant an ideal partner.

Revolutionary Process

The operations of Brunner Mond & Co. revolutionised alkali production in this country, and are a classic example of how large sections of the chemical industry can be rendered obsolete almost overnight by the observation of a laboratory worker aided by engineering genius. The process on which Brunner and Mond founded their great enterprise was the ammonia-soda, or Solvay process for the production of sodium carbonate, or soda ash, a commodity which is now not far behind coal in industrial and economic importance.

At that time Britain's 60-odd alkali producers were using the Leblanc method. By comparison with the ammonia-soda process, the Leblanc was dirty; wasteful and expensive, and was superseded.

The partners bought Winnington Hall and its parkland in 1873. In the first year they lost £4300 on the 838 tons of soda ash produced, and for some years their financial position was far from strong, but by 1875 production had reached 2000 tons a year, and showed a small profit. In 1877 they doubled their capacity.

In 1881, Brunner Mond was a limited company with a capital of £600,000 and had another factory at Sandbach. Expansion led to new products, the best known of them being washing soda. Refined sodium

bicarbonate was first made at Winnington in 1886, and in the following years a great number of other basic chemical commodities were added to the selling range, including ammonium chloride, bleaching powder, ammonium sulphate, sodium sesquicarbonate, soda crystals and caustic soda.

The company in 1887 had increased its capital to £1.5 million. Manufacturing facilities were further extended in the neighbourhood, and calcium chloride and ammonium carbonate added to the list of products.

Lime-Soda Process

The Winnington site was greatly expanded in 1912, when 240 acres of land near Wallerscote were purchased and brine fields at Holford were acquired. A great technical advance was made with the introduction of the lime-soda process for manufacturing caustic soda, which replaced the outmoded "Loewig" ferrite process.

Interests were acquired in other firms during the 1920s, in Chance & Hunt, in Buxton Lime Firms and in the Castner-Kellner works at Runcorn, which manufactured caustic soda by the electrolytic process.

By 1926, when Brunner Mond became one of the main parties to the formation of I.C.I., the original small factory had become the centre of a great organisation, with subsidiaries in China, Japan, India and Australia. The company made one of its many important contributions to British prosperity when it pioneered the production of synthetic ammonia, and so paved the way for the manufacture of the nitrogenous fertilisers which have made possible today's great agricultural yields.

BIRTH OF AN INDUSTRY

THE founding of the aluminium industry in 1888 was celebrated in Pittsburgh last month. The occasion was marked by the re-enactment of important events in the history of the industry, under the auspices of the Historical Society of Western Pennsylvania.

The progress over the years was shown by Mr. A. V. Davis, chairman of the Aluminum Board of America, who poured the first aluminium ingot with the help of the late Mr. C. M. Hall, inventor of the electrolytic process which is the basis of the modern industry.

Cresylic Acid

Revised British Standards

TWO revised standard specifications have been issued by the British Standards Institution for cresylic acid—517: 1948 for acid of specified orthocresol content, and 521: 1948 for acid of specified *m*-cresol content. Both were prepared under the supervision of the Tar Products (other than ammonia) Industry Standards Committee by a special drafting committee on which the bodies principally interested and individual manufacturers were represented. The standard specifications were first issued in November, 1933, and revised in September, 1938.

BSS 517: 1948 for cresylic acid of specified *o*-cresol content specifies that it shall consist of colourless to very pale clear liquid or solid, which may darken to light brown on exposure to light; and shall contain 45-90 per cent *o*-cresol, as determined by the method laid down in the appendix, with 5 per cent variation range. A new clause on distillation residue has been inserted. Other factors defined include water content, sp. gr., distillation, neutral oils and pyridine bases, SH_2 , freedom from acids and alkalis, sampling and size of sample.

Appendices A-H describe methods of determination and appropriate apparatus, as described in Standard Methods for Testing Tar and Products (2nd edit. 1938, and revised sect. 7, September, 1943).

BSS 521: 1948, for cresylic acid of specified *m*-cresol content is similar to the above *o*-cresol specification but includes five grades according to *m*-cresol content between 43 and 61 per cent, including methods for determination of both *o*- and *m*-cresol. In the first two grades there is no limit for *o*-cresol; in C and D it is 8 per cent, and in grade E 15 per cent, with permitted variations of $2\frac{1}{2}$ per cent. Both specifications are obtainable from the British Standards Institution, 24-28 Victoria Street, London, S.W.1, the first 2s. 6d. and the second 3s., post paid.

Brazilian Explosives

The installation of a large explosive factory—which has been under construction since 1946—is now nearing completion at Goisabal in the State of Rio de Janeiro. This plant which has six manufacturing units, has been built by Industrias Quimicas Brasileiras "Duperial" S.A. for the production of sulphuric acid, nitric acid, nitro-cellulose, nitro-glycerine and other explosives. Ample margin for future expansion is afforded by the factory site, and it is intended that the new plant shall contribute largely towards making Brazil independent of imported explosives.

Gas Industry Exhibition

Publicity for Coal Derivatives

THE rôle of the gas industry as a supplier of tar and tar chemicals, rubber accelerators and materials for the plastics and other industries is given prominence at "The Nation's Wealth" exhibition which opened this week at Gas Industry House, Grosvenor Place, London, S.W.1.

The exhibition is divided into sections—agricultural, medical, commercial, etc.—each of which is represented by photographs, models or specimens of the products concerned, with information giving facts and figures.

In serving the numerous and varied aspects of the gas industry more than £500,000 annually is spent on research to improve methods of coal carbonisation, increase efficiency of gas-using appliances and find new ways of utilising gas and its by-products.

The exhibition is open daily from 10 a.m. to 6 p.m., free of charge.



The composite exhibit representing some of the gas industry's chemical products, and particularly tar, source of 2000 derivatives

Developing Glass Fibre Products

Domestic and Industrial Uses

A NEW factory, officially opened recently, has been built in the Possilpark district of Glasgow for Fibreglass, Ltd., and is to be used for producing yarn from fibre glass.

At a luncheon which preceded the opening of the factory, Sir Hugh Chance, chairman of the company, said the process had been introduced to Britain 18 years ago at the Firhill works of Chance Brothers. The rate of development seemed to justify the setting up of a separate company in association with Pilkington Brothers, St. Helen's, Lancs. The most important of the established uses of textile glass was for the insulation of electrical machinery, but the firm was rapidly developing fireproof decorated materials.

The opening of the new factory greatly widens the prospect of production of glass silk fabrics. Many of the difficulties which surrounded the earlier production of glass silk cloths have been dissipated. Dyeing, for instance, has been largely mastered and in the range shown at the new plant, colour was a dominant feature.

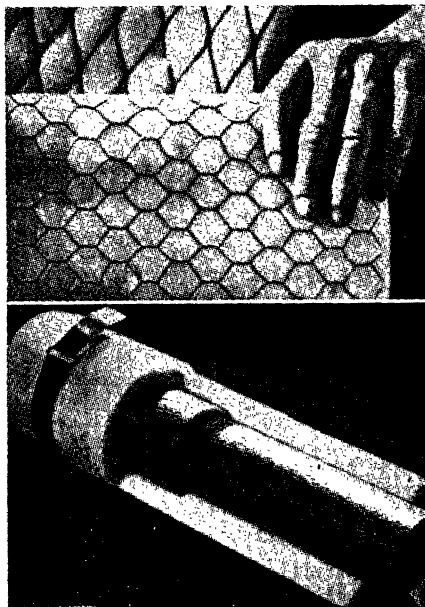
The work of production of fabrics will be carried on by several textile producers in addition to Fibreglass, Ltd. The top floor weaving plant being established will undertake research and experimental weaving work, the results of which will be made available to interested manufacturers using glass silk yarn.

A potentially important use of glass fabric is in the aircraft combining expanded rubber insulation, fibreglass and nylon. The fibreglass is laminated and applied, using the rubber as the interior of a sandwich, giving an insulated board of great strength and relative lightness. Board of this type is being used in the construction of the Hermes IV and it is likely that an important future exists for such combinations, particularly as they are fireproof.

Strength and Lightness

The high strength-to-weight ratio is demonstrated in the manufacture of firemen's helmets from glass silk fabric, laminated and moulded.

The new factory was begun in 1946 and will take over the work which has been done, till now, at the Chance Bros., Ltd., plant at Firhill, Glasgow. The ground floor houses the melting and drawing plants.



Fibreglass bat wool backed with wire netting can be used in all structures requiring thermal insulation, or serves as rigid sections for lagging pipes

Production is fully mechanised in the initial manufacturing stage, the factory having some 24 electric furnaces on an upper platform level. Marbles, made in the plant are fed by gravity into the battery furnaces, the molten glass dripping through the 102 apertures in each to form continuous threads. These are drawn by battery of drawing machines located directly below the furnaces and the resultant sleeves of wound filament are passed to the first floor for twisting and doubling. The factory is a model unit, with good natural light, fluorescent lighting, internal transportation and lifts, canteen and welfare facilities.

One other interesting development in this field not handled in Glasgow, is bat wool-glass fibre resembling cotton wool and made in St. Helens. This is now being used extensively as a lagging material in the oil industry. Staple tissue is being used to lag oil piping in many of the world's oil-fields and has already proved successful. It is virtually rotproof and can thus add immensely to the life of the steel pipeline.

Electric blankets, decorative rope, varnished glass sleeving and isomantles are other important products deriving from the manufacture of glass silk fabric.

"Hall Mark" for Plastics

Certification for Powders and Products

A WIDELY based scheme elaborated by the British Plastics Federation and the British Standards Institution to procure the use of identifying marks on containers of plastics moulding powders and articles made of plastics was introduced at a meeting organised by the two bodies in London this week. The scheme, which has its roots in earlier efforts to the same end which had to be suspended during the war, will at present be restricted to phenol formaldehyde and urea formaldehyde moulding powders and articles made from them.

The two organisations have adopted as a certification mark a circle enclosing the letters BS and BPF, representing "British Standard" and the name of the federation, and smaller code letters and numbers will identify the manufacturer and the specification employed. The scheme is supported by British Standards Specifications for a number of plastics articles, the number of which it is intended shall be greatly increased, and licences to employ the "Plastics Mark" have already been issued to seven firms conforming with the specifications, among them Bakelite, Ltd., British Resin Products and I.C.I., Ltd. Applications for such licences are invited by the BPF and the BSI and will be granted if satisfactory reports are made by a BSI inspector and special sub-committee.

Routine Tests

In respect of moulding powders, it is possible that a technician in the works of the applicant will be asked to act as "inspector" statistical control charts will be needed and the following routine tests will have to be performed and recorded: powder density, cup flow test, cross breaking strength and power factor. The certification mark for powders has been registered in most Commonwealth countries and in Argentina, Sweden and Switzerland.

Copper Sulphate Declines

Sales Lowest for 24 Years

A CONTINUED sharp reduction in overseas sales, due largely to import restrictions, was reported at the 24th annual general meeting of the British Sulphate of Copper Association, Ltd., held at the association's offices in London last week.

The chairman, Mr. J. D. McKechnie, in reviewing the activities for 1947/48 said that the period had been most disappointing, and sales were the lowest ever made during the 24 years of the association's existence.

Exports of sulphate of copper from the U.K. had fallen from 52,698 tons in 1945/46 to 30,103 in 1956/47. Unfortunately, 1947/48 showed a further reduction of 5437 tons making a total of 24,666 tons for the year.

Resistance to Imports

This further serious drop in export trade, the chairman emphasised, was not due to any lack of demand from regular markets but resulted from import restrictions, etc., designed to protect the national economic position of some countries, shortage of sterling, the carry-forward of stocks from the previous season, and weather conditions.

No effort had been spared by the association to increase sales. Representatives had visited Greece, Italy, Portugal, Spain, Egypt, and Germany during the period under review. Constant contact had been maintained with the Board of Trade, although they had been able to assist in one or two cases, results obtained had been, on the whole, disappointing, particularly in Italy.

The export figure for 1949 calendar year, said Mr. McKechnie, had been arranged with the Board of Trade at 36,000 tons. It was, he pointed out, a modest target which the association was well able to reach and exceed provided the Board of Trade fulfilled its part in trade negotiations with foreign countries.

Australia's Gift to BPI

THE half-yearly meeting of the Association of British Pharmaceutical Industry, held at Bournemouth recently under the chairmanship of Mr. C. A. O. Rideal, was attended by more than 60 representatives of member firms.

The pharmaceutical industry's part in the National Health Service and its relation to export enterprise were among the important matters which were under review. The association entertained at dinner Mr. J. R. Borland, representing the Wholesale Drug-gists' Section of the Victorian Chamber of

Manufacturers in Australia, which had presented a golf trophy for competition by members of the association. Replying to an address of welcome by the chairman, Mr. Borland said it was essential that there should be increased friendly relationships between this country and the Dominions, and the warmth of the hospitality which he had received from members of the association matched the deep feelings of regard which had prompted the gift from the Australians.

MODELS FOR PROCESS EXPERIMENTS

Scope and Limitations of Similarity Criteria

WHAT constitutes "similarity" between a model and a plant is a problem very familiar to process investigators. Similarity criteria for *single* processes have been devised for a wide range of cases, e.g., Reynolds dimensionless group for fluid flow. In a recent paper to the Institution of Chemical Engineers, however, Mr. M. W. Thring, M.A., F.Inst.P., discussed "The Construction of Models in which more than one process is similar to the original."

Two main reasons exist for using models, observed the lecturer. The first is to show how far the behaviour of plant can be predicted from pilot or laboratory scale experiments—"prediction similarity." The lecturer was concerned with the second purpose, "diagnosis similarity," where it is desired to study an existing large-scale process on a small-scale model.

By a single process system is meant one in which the pattern of only one of the processes is made similar in the model and in the original. The standard example is frictional force in the flow of a fluid along a pipe. This force is governed by viscosity when the velocity is low and by physical movement of the gas when the velocity is high. Hence the condition of similarity is that the ratio of the two must be identical in the model and the original. Reynolds number is this ratio.

When gravitational forces act but viscous forces may be neglected, the condition is based on the ratio of inertial forces and gravitational forces. This gives the Froude

number, which resolves itself to $\frac{L}{\tau^2 g}$, where

L is characteristic length, τ is characteristic time. By applying these principles furnace systems have been studied in models by the use of cold air or even cold water.

There is difficulty in constructing a model to give patterns simultaneously for

two or more processes in the original, because there are in general insufficient free parameters. In practice, length, pressure and temperature scales are usually fixed by considerations of convenience and only the time scale is left free.

Bases of Similarity

Damköhler¹ has worked out the criteria for scaling up or down a chemical reaction vessel through which gases flow reacting with each other and with the walls with heat liberation or absorption. He distinguishes five processes each consisting of competition between 2 "sinks" for momentum, molecules and heat.

For dynamic similarity, Reynolds number is the criterion. The remaining four are as set out at the foot of the page.

It will be noticed that the latter two criteria refer to heat flow in the same way as the first two to the flow of matter.

Provided either chemical resistance or dynamic resistance dominated the other, similarity could be obtained by satisfying the appropriate criteria. If all are equally important then only four degrees of freedom are available to satisfy all five criteria.

Bosworth has suggested, however, that in a catalysed system the effective activation energy of the reaction can be adjusted by varying the catalyst activity. In that case, the necessary number of degrees of freedom is obtainable and, theoretically at least, similarity is possible.

Other similarity criteria which may enter into other multi-process systems include the density ratio where two fluids are flowing or where it is desired to replace the effect of temperature changes upon density and to work at room temperature.

In the use of "Diagnosis Similarity" we are in a stronger position than with "Prediction Similarity," because in the existing plant one or two processes may be known to dominate. The similarity criteria relevant to those processes then can

		Molecules generated/sec. by reaction
1st chemical criterion	=	$\frac{\text{Molecules removed/sec. by flow}}{\text{Molecules generated/sec. by reaction}}$
2nd chemical criterion	=	$\frac{\text{Molecules removed/sec. by diffusion to walls}}{\text{Heat generated/sec. by reaction}}$
1st thermodynamic criterion	=	$\frac{\text{Heat removed/sec. by flow}}{\text{Heat generated/sec. by reaction}}$
2nd thermodynamic criterion	=	$\frac{\text{Heat removed/sec. by conduction or radiation to walls}}{\text{Heat removed/sec. by conduction or radiation to walls}}$

be selected for satisfaction in the model.

The physical variables that can be conveniently controlled in a model are the length and the time. Even here there are, of course, limitations since increase of velocities beyond a certain point brings in further physical processes which are necessarily dissimilar from those of the original. The methods which are available for models containing essentially two processes can be classified as under.

1. Where one physical process is rate-determining for both.

2. Where it is possible to study over a range of values for two similarity criteria by adjusting the time scale and then interpreting the results on the full scale.

3. Where different criteria can be simultaneously satisfied.

4. Alteration of the geometry of the system.

An interesting example of case 2 is in the cooling of a metal bar by conduction

to the skin and radiation to its surroundings. Here, a half-scale model is found to require a linear velocity twice that of the original as far as conduction is concerned, but identical as far as radiation is concerned. The model is accordingly studied over a range of velocities between that of the original and twice that value. Any dimensionless parameters which do not vary greatly can be expected to apply to the full scale. Quantities which do vary greatly cannot be expected to apply directly to the full scale.

These devices have been applied by Mr. Thring² in the iron and steel industry in studying open-hearth furnace and blast-furnace problems.

¹ G. Damköhler, in Eucken & Jacob's *Der Chemie Ingenieur*, 1937, Vol. III, Part I, 453/468.

² M. W. Thring, "Application of Similarity Principles to Thermal Transport Systems," *Nature*, Feb. 1947, 159, 208.

Research on Synthetic Oils from Coal

DESCRIBING research and development work already being carried out by the Bureau of Mines and others in the production of synthetic liquid fuels, Mr. J. D. Doherty, assistant chief of the Office of Synthetic Liquid Fuels, U.S. Bureau of Mines, called for prompt erection of at least some commercial plants because "synthetic liquid fuels are not going to do us very much good in an emergency if we have to start from scratch."

He was speaking at the 11th annual fuels conference of the American Society of Mechanical Engineers and the American Institute of Mining and Metallurgical Engineers, held at White Sulphur Springs, West Virginia, at which he outlined a programme for the production of 1 million barrels daily of synthetic oils from coal.

Based on estimates of the Bureau of Mines, the programme calls for a total investment of 8.7 billion dollars, including plants, mines and product pipe lines. The 1 million barrels per day of oil from coal would consist of the following products: liquified propane and butane (LPG) 86,000 barrels; high grade motor spirit 648,000 barrels; diesel and furnace oil 266,000 barrels.

Even though geological estimates of coal reserves are constantly being revised, "no reasonable revision could alter the conclusion that coal is our outstanding fuel reserve and that coal can furnish oil at present rates of consumption (2 million barrels per day) for centuries to come," Mr. Doherty declared. "Moreover, the day when synthetic oil from coal will begin to supple-

ment our petroleum supplies does not appear to be far off."

Estimated liquid fuel resources of the U.S.A. are: coal and lignite 87 per cent or 2600 billion barrels; oil shale 9 per cent or 270 billion barrels; petroleum and natural gas liquids 2.9 per cent or 86 billion barrels; natural gas 1.6 per cent or 48 billion barrels.

In general, the speaker said, the oil should be produced about equally by the gas synthesis or Fischer-Tropsch method, and by the coal hydrogenation process. The Bureau of Mines was promoting research and development work in both the principal processes, in addition to the extensive work by the leading oil companies and others, particularly on gas synthesis.

The New York correspondent of the *Financial Times*, in an article on November 9, stated that a large number of pipe-lines, mostly out of Texas, will in a year or two be delivering to American industry and householders the heating equivalent of Britain's coal production. Current deliveries run around 4,500,000 million cu. ft. a year, with an equivalent in thermal units of about 170,000 million tons of coal. The recent growth in production of natural gas in the U.S.A. is stated to be the result chiefly of technological advances, mainly in drilling and in piping. Deep drilling to the depth of 15,000 to 19,000 ft. has resulted in the bringing in of a considerably higher proportion of gas wells, particularly in the Texas Gulf Coast area. Pipe-line laying has been advanced by new techniques of coupling, alloying of steel, and bulldozing and earth-moving.

STUDIES IN RADIOACTIVITY

Background to Contemporary Chemical Uses

IN his lecture series on "The Impact of Radioactivity on Inorganic Chemistry,"* Prof. Eméleus continued with a discussion on "The Experimental Study of Radioactive Substances." He opened by demonstrating the yellow fluorescence in uranium glass and also the rapid discharge of an electroscope by a source of radiation.

α -Rays. It was Rutherford who established the identity of α particles with helium. This he did by permitting them to pass through the glass wall into a vessel and, after various steps of purification, obtained the spectrum of He from the resultant gas. It is possible to count directly the number of particles by allowing them to pass through a small hole on to a zinc sulphide screen.

By multiplying up the number over the total surface area of the imaginary sphere surrounding the source at the distance of this aperture, the total number of particles is obtained. One α produces one He.

The first studies of the particles were made in Wilson's Cloud Chamber by observing the tracks of water produced along the trail of the particles in a super-saturated atmosphere. They are deflected in an electro-magnetic field and the ratio charge

of $\frac{\text{charge}}{\text{mass}}$ can be derived.

The spread of ranges of the particles from various disintegrations has been investigated. Velocity falls continuously from the source but the ionisation effect is most intense towards the end of the track, which is usually 6 to 7 cms. long in air. All the ranges are below 9 cms.

Photographic and Microscopic Records

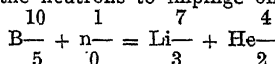
Tracks may be examined by incorporating the source directly in photographic plates, but they are then shorter because the medium is denser. Hence microscopic examination is used. Fission fragments often collide with fresh nuclei in the emulsion itself. β -particles are negatively charged, light, have a greater velocity and range than the α , and a more complicated velocity spectrum (i.e., distribution). Stopping power here, too, is proportional to log. atomic number.

In the Wilson chamber track there are more deviations and there is less ionisation along the path. γ -rays are electro-

magnetic in character, have no charge and are not deflected by an electromagnetic field. Wavelength ranges between 10^{-8} and 10^{-11} cms. (i.e., from short x-rays to 10^{-10} Å). In the upper range wave-length is determined by crystal diffraction methods.

The positive electron— e^+ —is similar to the β rays in properties and in the technique used for dealing with it—except that it is oppositely charged. When they meet they eliminate each other and penetrating γ radiation is produced.

Neutrons possess no charge and no ionising effect; they give no Wilson chamber track. Hence for their detection a secondary effect is needed. This may be (a) measurement of the radioactivity induced in indium or gold foil, or (b) detection of the α rays produced by permitting the neutrons to impinge on boron



Measurement of Half-Life

Different methods have to be used to compute different values of the half-life period.

1. For long periods, such as that of uranium, the number of particles emitted is directly counted in arbitrary units of time and quantity.
2. For medium periods the activity is measured at two different times and hence derives the rate of decay.
3. For times less than 20 minutes, the procedure is as for 2, but an allowance has to be made for the decay taking place during the period of measurement.
4. For very short lives there are mechanical devices consisting of a disc with the sample (containing of course the "parent" atoms) rotating past a counter. The rate of revolution is varied and that corresponding to the maximum count gives the life of the short-lived element.
5. Electronic methods also may be used for short lives. A circuit may be triggered so that the time scale shows a peak when the atom is formed and a second when it is discharged.
6. The Geiger-Nuttall relationship between log. range and log. decay constant may also be used.

Geiger-Muller counters are used for β and γ rays. They consist of a metal tube with a wire running through the middle, filled commonly with argon at 10 cms. pressure and a trace of organic vapour, and fitted with a window. The metal case is earthed, the centre wire charged to 100-1500 volts. An ionising particle causes multiplication of ions by acceleration and collision and thus produces an amplified detectable impulse. The pulse is self-limiting, due to the formation of a space-charge. Scaling counters are used which apply to an electro-mechanical counter only one pulse in 10 or 100.

* A summary of the first of Prof. Eméleus's lectures, given under the auspices of the Oil and Colour Chemists' Association, appeared in our issue of October 23.

α counters consist of an electrical condenser of which the plates are charged at about 1000 v. potential difference, the specimen being positioned between the plates. Each particle gives a pulse which temporarily lowers the voltage. This effect is used for the detection. Thus the α counter uses the direct ionisation effect but the β one requires a multiplying effect. C^{14} and S^{35} require special β counters to register their very moderate radiation.

Radioactive Tracers

Tracers may be produced in the cyclotron or the pile. In the cyclotron, an ion is made to produce ions, perhaps hydrogen ions or deuterons, and these are accelerated to very high energies. On bombarding a target, a portion of this is transformed and the products may be investigated.

In the pile, which consists of U^{235} , U^{238} and pure graphite moderators, the U^{235} undergoes fission and yields neutrons. These, originally fast, are slowed down by graphite. Some produce fresh fissions, some are captured by U^{238} and produce Pu.

For the production of tracers, samples are placed in graphite blocks and slid along channels into the pile. The products have to be handled by the technique of microchemistry and with great attention to health precautions.

The unit of radiation is the Curie representing a activity equivalent to 1 gm. of pure radium or 3.7×10^{10} particles per second. This is a large unit and the milli- and micro-curie are more usual. Work with tracers is usually in the micro-curie region and is quite safe. Above that, the milli-curie level requires some protective measures and checks on laboratories and personnel. At the curie level, the laboratories are considered "semi-hot" and are equipped with much special screening and special air ventilation with provision for purifying the air.

Ionisation

In the third lecture, concluding the series, Prof. Emeleus discussed two separate aspects of the subject of the effects of radioactivity in inorganic chemistry.

For the reaction between hydrogen and chlorine the quantum yield if the reactants are illuminated is of the order of 10^5 . 10^6 . Radiations from radioactive sources also promote rapid combination with a high yield. The yield is calculated as HCl produced per ion pair. The same kind of chain reaction is encountered; only the initial stage is different, being in the latter case an ionisation effect. Polymerisation may also be started by these radiations.

Important practical consequences arise. In the isolation of plutonium and of other

radioactive products of the atomic pile, the radiations cause some decomposition in the reagents used, such as solvents. In the cooling water, moreover, dissolved air may yield oxides of nitrogen and nitric acid causing corrosion of the pipework. The graphite itself expands due to a change in the lattice; this causes a progressive mechanical weakening of the pile.

The question has been raised whether technical synthetic use may be made in industry of these chemical effects. Could, for instance, ammonia be synthesised simply by passing its constituent gases through channels in the pile? Research is in progress on these and other similar problems.

Measuring Activity

A concept much used in tracer work is *Specific Activity*, i.e., the proportion of

active atoms present, $\frac{A}{A + A^1}$ where A is the

number of active, A^1 the number of inactive atoms. Tracers are usually applied in very small quantities mixed with a large amount of inactive "carrier" since the means of detection are so delicate. In calculating the dosage for a particular investigation, the probable final concentration is estimated and from this the decision is made on the initial dose.

At the beginning of this type of work, Paneth used natural radioactive atoms as tracers, e.g., thorium C (an isotope of bismuth) + magnesium. On dissolving the magnesium in the acid, the activity is found in the evolved gas. By this means it was possible to detect 10^{-15} g. bismuth in investigations. In general, an important field of application of the technique is for the detection of small quantities. Thus Paneth used radon to detect leakage of air through gas masks.

Radioactive tin has been used in studying metal transfer in bearings. Radioactive mercury has been admixed for laboratory determinations of mercury content.

In surfaces coated with a thin gold glaze the gold has been determined by irradiation with slow neutrons under controlled conditions. The resultant activity is a measure of the gold content.

The extreme sensitivity of detection of radiation has made the technique applicable to the determination of the solubility of "insoluble" substances and the volatility of the "non-volatile." Five hundred radioactive isotopes are now known. Most elements have several, nearly all have one. Some are more commonly used than others, particularly those with long half-lives.

H^3 which is β active (32 years) and has

very soft radiation is much used. It is made in the cyclotron— Be^9 (d, 2α) H^3 —or in the pile— Li^6 (n, α) H^3 .

A good deal comes off as gas, the rest remains in the target. It can be driven off, or made to react with oxygen in copper oxide, yielding water of composition H^3DO .

Phosphorus

Phosphorus is of outstanding importance in biological work. Natural phosphorus is P^{31} ; the most useful of the four radio-isotopes is P^{32} (14 days). There are five ways of making it.

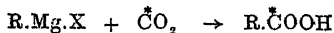
In the pile, it is produced as CS_2 , S^{32} (n, p) P^{32} .

The phosphorus may be precipitated as phosphate and supplied to users as phosphoric acid. Studies carried out with this element have included some on its distribution in rat incisor teeth and on the proportion of fertiliser chemicals actually taken up by plants. In general, distribution, excretion and retention of phosphorus by various animal bodies (including human) have all been studied with the aid of P^{32} .

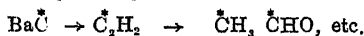
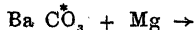
Carbon and Sulphur

C^{11} (20 mins., β) and C^{14} (5000 years) are both active. The latter is made in the pile from calcium nitrate in aluminium cans— N^{14} (n, p) C^{14} . The carbon is isolated as barium carbonate and from this the organic compounds required are synthesised *via* reactions with CO_2 .

Thus



Also



Or



The rate of discharge of CO by human subjects who breathed first this gas then oxygen, has been studied with the aid of radioactive carbon.

S^{35} (87 days) is produced in the pile from Cl^{35} and used in studies of the solubility of "insoluble" sulphates and of the equilibrium reached by the mixture $\text{S}_2\text{Cl}_2 + \text{S}$. The fact that in mustard gas systemic poisoning sulphur settles in the bone marrow was also elucidated using S^{35} .

In the production of radioactive iodine it was discovered that the energy supplied so greatly exceeds the bond strength that decomposition occurs— EtI (n, γ) I^{131} .

The iodine is present as free iodine, reducible to HI , from which it is precipitated as the silver salt. This is an automatic concentrating effect, since the organically combined iodine remains behind. Similarly on irradiating potassium permanganate, manganese dioxide is precipitated as MnO_2 .

Among other applications of the general principle the following have been noteworthy in differing spheres. The specific surface of a particulate sample of strontium sulphate solid was found, by the use of active strontium, to be about 30,000 cm^2/gm .

Diffusion of gold at high temperatures was studied by the use of active gold (2.7 days).

The isotope dilution method of analysis has been used with success, based on the addition of active isotope, thorough mixing, and determination of the proportion in a recovered small amount.

Clinical use has been made of CO^{60} (7 years) made in the pile. Its hard β and hard γ radiations have been used in a similar way to radium radiations.

Radioactive isotopes are becoming more readily available and investigators who can state a case for the use of them can often obtain them from Harwell. The lecturer hoped that some of his audience would avail themselves of these new resources in the solution of their own problems.

THORIUM IN NUCLEAR FISSION

PROMPTED by an increasing number of inquiries being received from individuals and small companies interested in monazite, the principal ore from which the element thorium is obtained, the Atomic Energy Commission, Washington, D.C., has outlined the nature and extent of its present interest in thorium.

While a strict control of export and a complete record of domestic movements of thorium-bearing materials, including monazite ore, is maintained by the commission, pursuant to the Atomic Energy Act of 1946, the usefulness of thorium and its principal source in nature, monazite ore, so far as the commission's programme is concerned, is limited for the present to research. Accordingly, the only thorium the commission purchases is for experimental purposes, chiefly in the form of thorium salts, and the commission has no facilities for employing monazite ore.

Current demand for monazite ore arises principally from its established uses outside the atomic energy since it is the only commercial source of the element cerium and other rare earth materials which are essential to many industries.

THE SAFETY ORGANISATION

Establishing Effective Control in Chemical Works

THE most effective types of organisation and of persons for securing the reduction of health hazards in industrial chemical works was one of the subjects to which close study was given at the conference in Harrogate organised by the Royal Society for the Prevention of Accidents in collaboration with the Association of British Chemical Manufacturers (THE CHEMICAL AGE, November 6). The statistical aspects of safety campaigns were also dealt with at length.

Central Control

Mr. H. R. Payne, chairman of the Works Safety Committee of the ABCM, in a paper entitled "Principles of Safety Organisation," said that in every works, however small, there was the obligation upon the management to sponsor and organise efforts to reduce accidents to a minimum, i.e., that there should be some definite form of safety organisation. This need not be complex, nor, in smaller works, imply increased personnel.

The safety organisation, said Mr. Payne, should be centred in one person, who should be able to earn for himself a status which commanded confidence among all ranks. The function of the safety officer, whether whole- or part-time, was advisory and not executive; responsibility for safety could not be diverted from the works management.

The building up of safety organisations must be done from experience of individual works, which must be based on the individual characteristics of those works and the people of all ranks employed there. In one large group, for example, where some success had been achieved, there were about 12 main manufacturing divisions and more than 80 works, but there was no "standard" form of safety organisation. Each division had a full-time safety officer and staff directly responsible to a division director—usually the production or technical director.

Each works had a form of safety organisation which it had built up to suit its own needs. There was a central safety office, directly responsible to the main board technical director; its job was to co-ordinate, advise, stimulate and provide special services on request.

Sources from which potential safety officers might be drawn, continued Mr. Payne, needed also to be considered in the light of experience. In a chemical works, for example, there was at first glance a case for appointing a chemist, and there were several good instances of this; but it should first

be considered whether the man himself did not feel that the appointment was a serious interruption to his career, or whether the appointment had been made primarily for the reason that the man showed no signs of making further progress in his chosen profession.

Another possibility, Mr. Payne said, was to regard safety as part of the functions of the personnel, labour or welfare department, and excellent work had been done in this way, especially in the early stages of some successful safety organisations. The consideration here should be as to whether or not the safety organisation was sufficiently closely in touch with actual problems of factory management and production.

Still another alternative, the speaker said, was to regard the engineering department as providing a suitable home for the safety organisation. While there were successful examples, this form was not advised in the chemical industry, but it was obviously highly desirable that the safety organisation should have close and constant contact with the engineering department.

A fourth course, which possessed advantages in the case of a larger concern, was that the safety department should be a separate organisation responsible direct to a technical or production director, a works manager, or similar senior executive.

The Safety Officer

The status of a safety officer, this speaker said, particularly in works of 500 persons or more, was also important. The desirable standard was that the safety officer should be able to discuss works matters on level terms with the senior supervisors in the factory. This obviously could not happen when the appointment was regarded as a junior one or where a more appropriate designation might be "safety inspector" or "safety foreman."

It had been suggested that the aims of a safety organisation should include the following six conditions, and although they represented a high, if not ideal, standard, they provided targets for the whole of the personnel of the factory.

(a) When hazards inherent in the work has been eliminated as far as possible by satisfactory plant design, and when procedures have been devised to reduce to a minimum hazards that cannot be thus eliminated.

(b) When the lighting, heating, ventilation and general environment of working places are completely adequate.

(c) When internal arrangements for the storage and handling of material are satisfactory and housekeeping is of a high standard.

(d) When the supervisory staff accepts responsibility for directing the work of accident prevention and takes effective action to remove or remedy hazards as they appear.

(e) When all employees have been properly instructed in safe working procedures and the use of personal protective measures.

(f) When all machinery is effectively guarded and when there is adequate equipment provided and properly maintained for all tasks that have to be done.

Mr. Payne's paper concluded with a citation of the provisions of the International Labour Office's draft model code of safety for factories.

Methods of Classification

"Accident Records" was the title of a paper by Mr. H. G. Winbolt, director of the Industrial Safety Division of the Royal Society for the Prevention of Accidents. Mr. Winbolt said the safety officer was in the peculiar position of having to judge his progress, and to some extent even to plan his activities, by recording his failures. For this he used accident—or more correctly injury records, i.e., he recorded, classified and analysed data concerning injury-producing accidents.

Mr. Winbolt then dealt with the various accident recording systems in common use in Great Britain. Those based on the provision to the safety officer of early information of an accident should, he suggested, scrupulously avoid tempting ambulance staffs to give opinions on the nature of such accident or its causes.

He considered that the responsibility for accidents and their prevention belonged to the production personnel. The report form that would eventually provide full details of each accident should, therefore, be initiated by the operating department in which the accident happened and not by the safety or other functional department.

Where a works had enough accidents in, say, a year (or any shorter period) to make tabulation useful, the speaker recommended classification by type of accident (or injury cause), and by nature and location of injury.

As regards accident rates, went on Mr. Winbolt, formulae recommended by the International Labour Office had been in use in Britain for over 20 years. They obviated the hit-and-miss (and often misleading) comparison of total accidents in one period with total accidents in another. Lost-time accidents, i.e., accidents causing loss of time (or transfer to alternative work), extending beyond the day or shift on which the accident happened, were the basis here as in all

other tabulations and forms in use. In addition, it was necessary to know the total man-hours worked (exposure to risk) and the total man-hours lost (or on alternative work) owing to lost-time accidents. There were two rates, as follows:—

$$\text{Frequency rate} = \frac{\text{Lost-time accidents} \times 100,000}{\text{Man-hours worked}}$$

$$\text{Severity rate} = \frac{\text{Man-hours lost} \times 100,000}{\text{Man-hours worked}}$$

Details of the operation of this system, including the weighting of the severity rate for deaths and permanent disabilities, would be found in RoSPA's "Works Accident Statistics." All that needed be said was:—

(1) That the frequency rate was the only reliable guide available to managements or safety officers about the progress of their safety work and about how their results compare with those of others.

(2) The severity rate is interesting as giving information about the loss of production time, in relation to working time, but it is not directly controllable like the frequency rate. Severity is largely a matter of chance.

First-aid room records were referred to by Mr. Winbolt, who said that although these were valuable the safety officer should be wary of making public statistics of them or of using them for routine investigations. To do this might lead, not to a reduction in the number of minor injuries, but to a lowering of the standard of reporting. This would be undesirable.

BEILBY AWARDS

RECOMMENDATIONS for instances of work of exceptional merit or investigations in connection with fuel economy, chemical engineering, and metallurgy are requested for consideration for Sir George Beilby awards.

The awards, from interest derived from the invested capital of the Sir George Beilby Memorial Fund, are made at intervals by the administrators representing the Royal Institute of Chemistry, the Society of Chemical Industry, and the Institute of Metals. The awards are made primarily to encourage younger men who have done original work of merit over a period of years.

Communications should be addressed to the Convener, Sir George Beilby Memorial Fund, Royal Institute of Chemistry, 30 Russell Square, London, W.C.1.

DEPRECIATION AND MAINTENANCE—III

Computation and Accounting for Chemical Plant

by S. HOWARD WITHEY, F.Comm.A.

WHEN the residual value of a section of plant at the time of displacement is deducted from the original capital cost to arrive at the amount to be apportioned over the period of service life, it can usually be no more than a rough estimate; it may be so small that it might often be wiser to ignore residual value entirely when making the depreciation calculations. This probably explains why many chemical manufacturers rely on the straightline method and prefer to show on each balance sheet the book value of the entire plant as at the commencement of the accounting period, after deducting a proportion of the first cost, and add to this figure the value of any additions made during the year.

Computations of Value

As, however, the highest value which can be placed on chemical plant and engineering equipment consists of the original invoiced cost of acquisition plus the transport charges and any installation or foundation expenses, while the lowest value is the price which may be realised on the disposal of the material and parts (after allowing for the cost of dismantling), the computations must have some regard to the difference between these two extreme figures.

There is, of course, a wide difference between a percentage deduction calculated on the first capital cost of productive installations and the same percentage deduction when applied to the diminishing book values. This difficulty is sometimes overcome after making a number of calculations before deciding on a particular rate, or by ascertaining the amount which would be written off in a given period if the asset values are reduced at varying rates, and in this connection the following table gives the percentage of the original values which would be charged against the profits when equipment is subjected to annual deductions at rates varying from 6 to 10 per cent:—

DEPRECIATION TABLE FOR CHEMICAL PLANT

Years	6 Per Cent	7 Per Cent	8 Per Cent	9 Per Cent	10 Per Cent
1 ...	6.00	7.00	8.00	9.00	10.00
2 ...	11.64	13.51	15.36	17.19	19.00
3 ...	16.94	19.56	22.13	24.64	27.10
4 ...	21.92	25.19	28.36	31.42	34.39
5 ...	26.61	30.43	34.09	37.59	40.95
6 ...	31.01	35.29	39.36	43.21	46.86
7 ...	35.15	39.84	44.21	48.32	52.17
8 ...	39.04	44.03	48.67	52.97	56.95
9 ...	42.70	47.97	52.78	57.20	61.26
10 ...	46.14	51.61	56.56	61.06	65.13
11 ...	49.37	55.00	60.03	64.56	68.62

12 ...	52.41	58.15	63.23	67.75	71.76
13 ...	55.26	61.08	66.17	70.65	74.58
14 ...	57.95	63.80	68.87	73.29	77.12
15 ...	60.47	66.33	71.37	75.70	79.41
16 ...	62.84	68.69	73.66	77.88	81.47
17 ...	65.07	70.88	75.77	79.87	83.32
18 ...	67.16	72.92	77.70	81.68	84.99
19 ...	69.14	74.81	79.48	83.33	86.49
20 ...	70.99	76.58	81.12	84.83	87.84
21 ...	72.73	78.22	82.63	86.20	89.08
22 ...	74.36	79.74	84.02	87.44	90.15
23 ...	75.90	81.16	85.30	88.57	91.14
24 ...	77.35	82.48	86.48	89.60	92.02
25 ...	78.71	83.71	87.56	90.53	92.82

For example, in a case where the cooling, condensing and concentrating plant for acids had a book value of £3000 and it was desired to write off depreciation in such a way that the debit balance of the asset account in five years' time will be about £2300, the total amount to be charged against the periodical profits was £1600, or 41 per cent of the opening book value, so that the annual rate of deduction was fixed at 10 per cent.

Apart from the cost of repairs and renewals, a vital factor to be taken into consideration when computing the charges to be made against the profits is interest on capital, particularly when money is borrowed for the specific object of acquiring new or additional units of plant. It is true that the consent of the Treasury to new issues of capital has to be obtained, and that industry is expected to limit the amount of capital expenditure as part of the effort to narrow the import-export gap, but it is also inevitable that very considerable funds will have to be raised from time to time for plant replacement, modernisation and development, and to ignore the incidence of interest on capital would lead to a serious state of affairs.

New Capital Issues

When a business is expanded and mechanised with the aid of new issues of capital carrying interest at a fixed rate per cent per annum, the cost of acquiring and installing the plant is increased by the amount of such interest and it is advisable to make adequate provision for this in the depreciation calculations, and also in production costs. If this is not done the engineering and costing data would lose much of their value and, owing to faulty estimates and quotations, the margin of profit actually realised in the fulfilment of orders and contracts might prove to be insufficient. This in turn might easily cause a serious shortage of capital for essential re-equipment, and

the following example shows how the book values of plant can be systematically increased by the addition of interest at the appropriate rate in order that the total expenditure may be allocated over a definite period in the form of equal annual instalments against profits.

The directors of a company engaged in all-heat treatment work, and with no outstanding mortgages or debentures, obtained permission to issue cumulative preference shares carrying interest at 5 per cent and giving the holders the right not only to the fixed dividend of 5 per cent in any one year but also to any dividends which may fall in arrear, such arrears being carried forward until paid off. The existing plant and profit-earning equipment was re-allocated,

and it was decided that in future the cost and contract accounts should include interest on capital at the rate of 5 per cent and that the total burden (*i.e.*, capital outlay plus interest) should be spread over a period of ten years. Part of the proceeds from the capital issue was expended on furnaces and tanks for which a new account was opened in the company's private ledger with a debit entry of £15,000, this amount having been transferred from the "capital outlay" column of the purchases journal.

The annual amount to be credited to the asset account was arrived at by multiplying the decimal .120504 by £15,000, giving £1,942, and at the end of the period of ten years the account will show the following entries:—

Debit				Furnaces and Tanks				Credit			
1st year				£				£			
To Capital cost				15,000	By Depreciation written off			1,942			
,, 5 per cent. interest				750	,, Balance carried down			13,808			
				<u>£15,750</u>				<u>£15,750</u>			
2nd year											
To Balance brought down				13,808	By Depreciation written off			1,942			
,, 5 per cent. interest				690	,, Balance carried down			12,556			
				<u>£14,498</u>				<u>£14,498</u>			
3rd year											
To Balance brought down				12,556	By Depreciation written off			1,942			
,, 5 per cent. interest				626	,, Balance carried down			11,240			
				<u>£13,182</u>				<u>£13,182</u>			
4th year											
To Balance brought down				11,240	By Depreciation written off			1,942			
,, 5 per cent. Interest				562	,, Balance carried down			9,860			
				<u>£11,802</u>				<u>£11,802</u>			
5th year											
To Balance brought down				9,860	By Depreciation written off			1,942			
,, 5 per cent. Interest				493	,, Balance carried down			8,411			
				<u>£10,353</u>				<u>£10,353</u>			
6th year											
To Balance brought down				8,411	By Depreciation written off			1,942			
,, 5 per cent. Interest				420	,, Balance carried down			6,889			
				<u>£8,831</u>				<u>£8,831</u>			
7th year											
To Balance brought down				6,889	By Depreciation written off			1,942			
,, 5 per cent. Interest				344	,, Balance carried down			5,281			
				<u>£7,233</u>				<u>£7,233</u>			
8th year											
To Balance brought down				5,281	By Depreciation written off			1,942			
,, 5 per cent. Interest				264	,, Balance carried down			3,613			
				<u>£5,555</u>				<u>£5,555</u>			
9th year											
To Balance brought down				3,163	By Depreciation written off			1,942			
,, 5 per cent. Interest				180	,, Balance carried down			1,851			
				<u>£3,798</u>				<u>£3,798</u>			
10th year											
To Balance brought down				1,851	By Depreciation written off			1,942			
,, 5 per cent. Interest				91							
				<u>£1,942</u>				<u>£1,942</u>			

Reference was then made to an annuity table in order to determine the precise amount to be written off each year and charged against the production operations after the interest has been added to the opening balance of the plant account each year. The following extract from this table gives the decimal part of £1 required to write off £1 over periods ranging from four to ten years, after charging interest at the rate of 3 per cent, 4 per cent, or 5 per cent :

Years	3 Per Cent	4 Per Cent	5 Per Cent
4 ...	.269028	.275490	.282012
5 ...	.218854	.224627	.230975
6 ...	.184597	.190761	.197017
7 ...	.160506	.166609	.172819
8 ...	.142456	.148527	.154721
9 ...	.128433	.134493	.140690
10 ...	.117230	.123291	.129504

Interest Debited

The amount of interest to be debited to the account is calculated on the balance brought forward as at the beginning of each year, and is usually shown to the nearest £1. It should be noted that while the figure of £1942 will be transferred each year from the furnaces and tanks account to the debit side of the depreciation account, making a total of £19,420 for the ten years, the sum of £4420 will be credited to profit and loss, made up as below :—

1st year ...	£	750
2nd year ...	...	690
3rd year ...	...	626
4th year ...	...	562
5th year ...	...	498
6th year ...	...	420
7th year ...	...	344
8th year ...	...	264
9th year ...	...	180
10th year ...	...	91
Interest ...	£4,420	

In some cases, the annual interest items are credited to a reserve for plant replacement following a revaluation of the existing plant, and a number of definite advantages are associated with periodical revaluations of certain sections of chemical equipment on the part of experienced engineers or valuers of repute. The determination of independent asset values is nearly always satisfactory alike to the owners, directors, shareholders and auditors, while at the same time additional capital issues, whether of shares or debentures, are very materially assisted by the production of certificates of value signed by acknowledged experts. Moreover, insurance claims and appeals against assessments are likely to meet with a greater measure of success, and income tax allowances are usually granted more readily, and as it would not be necessary to report on the value of specific assets and on the ade-

quacy or otherwise of the depreciation charged against revenue, both directors and managers are relieved from such responsibility.

Discrimination between capital and revenue expenditure is simplified by bearing in mind that the items appearing on the debit side of any particular account must represent amounts which either will be received back at some future date or will not be received; in the former case they should be treated as items of capital expenditure to be incorporated on the assets side of the balance sheet. The principles can be demonstrated more specifically by referring to an actual case.

Recently an old-established chemical engineering business was taken over by a firm of producers as a going concern, including the works premises, machines, tools, and considerable stocks of materials and stores. In the purchaser's books, all these assets were treated as capital outlay and debited to appropriate accounts opened in the private ledger, and upon acquiring additional machines and tools for special purposes the net cost prices were posted direct from the book of prime entry to the debit side of the respective asset accounts.

At balancing time, the physical assets were subjected to a revaluation, the difference between the new valuation figure and the book value being written off against profits. The payment made for the goodwill of the business was regarded as a capital charge, but owing to the intangible nature of this asset it was decided to show on the balance sheet the original cost price and to deduct from this amount a proportion allocated towards extinguishing the item, this deduction being charged against current revenue.

Additional Works Premises

The total cost of acquiring additional works premises was, of course, treated as a capital charge, as also were certain legal expenses which had been incurred in connection with the transfer of the property, and as it was found necessary to undertake certain repairs in order that the machines and plant should attain their true value for the work to be performed, the full cost of these repairs was debited to the machines and plant account.

All future repairs and maintenance charges, however, will be charged against revenue and included in the operating costs, except in those instances where expenditure has the effect of increasing the market value of the assets. Transport charges on new plant were debited to the private ledger accounts on the principle that such amounts had the effect of increasing the cost, and repairs to second-hand and reconditioned

equipment were capitalised, while ordinary maintenance expenses were debited to profit and loss. As the extension of the works premises caused some of the firm's own workpeople to be detailed to take part in the operations, the wages paid out to these men were dissected and suitable transfers made from the wages account to the buildings account.

When computing and recording depreciation, users of chemical plant should not be unduly influenced by the scale of wear and tear allowances granted by the Inland Revenue, as under the prevailing conditions these rates are mostly inadequate and make no cognisance of the steep rise in replacement costs. In any case, the first cost of acquiring and installing profit-earning equipment must be regarded as the amount to be

spread over the period of service or useful life, and even if the Inland Revenue authorities granted no allowance for wear and tear this would still hold good. Unless the figures enumerated on balance sheets represent something like prevailing values, difficulties of one kind or another are almost bound to arise in attempts to secure fair and equitable assessments, and as wear and tear allowances are subject to variation from time to time they are doubtless governed, to some extent, by the degree to which the authorities are satisfied that suitable methods are in fact being adopted for providing for depreciation, whether the decline in value results from actual physical deterioration, obsolescence, effluxion of time or other causes.

(To be continued. Parts I and II of this article appeared on August 21 and October 2)

Goods Vehicles Restrictions

"Driving Time" Regulations Summarised

THE Traders' Road Transport Association has prepared a summary for the guidance of "C" operators of the section of the Road Traffic Act, 1930, which limits the permitted "driving time" of drivers of goods motor vehicles.

It is pointed out that "driving time" includes not only time occupied in actual driving, but also any "other work in connection with a vehicle or the load carried thereby."

A goods vehicle must not be driven : (1) for any continuous period of more than 5½ hours; or (2) for continuous periods amounting in the aggregate to more than 11 hours in any period of 24 hours commencing at 2 a.m.; or (3) so that the driver has not at least 10 consecutive hours for rest in any period of 24 hours calculated from the commencement of a period of driving.

A "continuous period" covers any two or more periods of driving time unless separated by an interval of not less than half-an-hour in which the driver is able to obtain rest and refreshment. This interval which must be taken after a "continuous period of driving time" of 5½ hours, may be taken on or near the vehicle provided that no work of any kind is done.

The period of 10 consecutive hours for rest may be reduced to nine if in the next 24-hour period the driver has at least 12 consecutive hours' rest.

During the long period of rest, as above, which must not be taken on the vehicle, the driver must be completely free of all duty

and of responsibility for the vehicle and its load.

Under the section, a person will not be liable to be convicted of an offence by exceeding the maximum permitted hours of driving if he can establish that the contravention was due to unavoidable delay in completion of the journey through circumstances which he could not reasonably foresee.

In such an event, it is highly important that the driver should immediately enter full details on his record sheet, as evidence. The matter should also be reported as soon as possible to his employer, so that the facts can be recorded.

RESEARCH AND PRODUCTION

THE importance of the relationship between research and production was stressed by Dr. C. J. T. Cronshaw, of Imperial Chemical Industries, in his address to the Manchester Literary and Philosophical Society at the meeting held in the College of Technology recently.

Of the development of research in I.C.I. the doctor said that production might be defined as a regularly "repeated experiment"; such repetition, however, was of no use without improvement; in the long run the ability to continue selling being the test of productive efficiency.

Research was an attitude of mind and should not be allowed to become the possession of any one department. It was a continuous function and should give an earning capacity much in excess of its own expenses to the industrial pattern of which it formed a part.

American Chemical Notebook

From Our New York Correspondent

THE announcement has recently been made by the Mellon Industrial Research Institute, Pittsburgh, Pennsylvania, that work will commence immediately on a \$950,000 expansion programme to include 50 new research laboratories, bringing the number of laboratories at the Institute to 175. At present 425 technicians are at work on about 80 diversified research projects at the Institute. Dr. William A. Hamer, assistant director of the Institute, said the new laboratories would support a relatively new and rapidly growing physical chemistry division and would provide additional quarters for advanced research in pure and applied science.

* * *

Operations started last week at the Victor Chemical Company's new Morrisville, Pennsylvania, plant which will produce phosphoric acid and other phosphorous compounds. The new unit, bringing to five the number of plants operated by the company, is the second to be completed in the company's postwar expansion programme. Elemental phosphorus, used at the new plant in the production of phosphoric acid and other phosphates, will be shipped from the company's phosphorous producing plants at Mt. Pleasant, Tennessee, and Tarpon Springs, Florida. Additional capacity at the company's Chicago Heights and Nashville plants will also soon be available.

* * *

Carbide and Carbon Chemicals Corporation, New York, announced last week the beginning of the first large-scale production of acetophenone, formerly available only in small lots, it can now be furnished in tank car quantities at a new low price, company officials said. A good solvent for fats, resins, oils, dyestuffs, and gums, acetophenone has a powerful but pleasant odour that makes it valuable as an odour-masking agent in perfume compounding. Commercial availability of the product is expected to stimulate its application in many new fields. The combination of the benzene nucleus and the ketone suggests possibilities for its use as a raw material in the manufacture of dyestuffs, rubber chemicals, pharmaceuticals, and insecticides.

* * *

In its recently issued report of operations to stockholders Walter S. Carpenter, Jr., board chairman, reports that production of

E. I. Du Pont de Nemours & Co., Inc., in the first nine months of this year "reached the highest level for a comparable peacetime period in the company's history." Sales for the same period increased from \$573,572,354 in 1947 to \$708,698,371. Net income for the nine months, including \$25 million dividend from the company's investment in the General Motors Corporation common stock, amounted to \$101,570,845.

* * *

The \$310 million loan agreement, with Great Britain announced by the Economic Co-operation Administration and the Export Import Bank, will have a stimulating effect on purchases of industrial machinery and equipment and raw materials from the U.S.A.. Oil refining and coal mining equipment are included, but the principal item is machinery from Pittsburgh for the new steel plant at Margam, South Wales.

* * *

Output of primary aluminium in August in the U.S.A. totalled 54,953 short tons, an increase of 4 per cent over the 52,937 tons produced in July, according to the U.S. Department of the Interior. This was the highest figure since the record of 55,450 tons in May, 1948. Demand was, however, still far in excess of supply—exports of alloy ingot and slab were almost nil, and imports of pig and ingot continued at a high level. Imports of aluminium ingot increased from 5886 short tons in July to 6951 tons, including increased quantities from the United Kingdom.

* * *

The first published price list for the new Rosslyn metal, the cladmetal which has a copper core bonded permanently to stainless steel surfaces, has just been issued by the American Cladmetals Company, Carnegie, Pa., which also announced that the metal is now being rolled in sheets of the standard widths, lengths, thicknesses and finishes used by manufacturers. The base prices apply to various grades and range from 78 cents to 94 cents per lb. The metal, which can be drawn, stamped, bent, spun and heat-treated to form various products, is being produced in a variety of work grades such as press work, deep drawing, spinning, welded structures and for special applications where metal is exposed to high working temperatures over 800°F.

Technical Publications

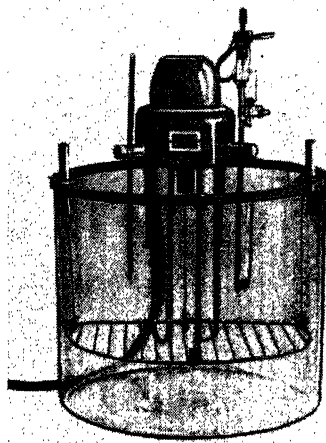
THE difficulties of dealing with "a commodity that weighs nothing" are described in an article on the problems of transporting liquid oxygen in the November issue (Volume 8, No. 6) of the "Leyland Journal." The change-over from gaseous to liquid form of oxygen has brought about fundamental changes, a 6-ton lorry now being able to carry in liquid form 100,000 cu. ft. which would previously have required at least 10 lorries. The modern containers on vehicles are circular and consist of a copper sphere, suspended by chains, in which the liquid is carried, covered by an outer casing with a dome-shaped top; magnesium is packed between the spheres as an insulating medium. On the British Oxygen Co.'s largest units, including Leyland Beaver 12.BB tipper models, the container carries 105,000 cu. ft. of oxygen and weighs approximately four tons and its contents one ton.

* * *

Coinciding with the announcement of the Government Bill for the construction of new trunk roads, a report on "The Economics of Motorways" was issued recently by a joint committee of the British Road Federation, the Institute of Highway Engineers and the Society of Motor Manufacturers and Traders. The committee claims that transport costs could be greatly reduced by construction of a system of motorways, which deserved to be given the highest priority, and deplores the lack of objectivity in the method of approach to road matters in the past. The great discrepancy between the sums expended on road construction and the huge total derived from motor taxation (which yielded £97 million in the year to March, 1948) is one of the interesting items of "Basic Road Statistics" for 1948 just issued by the British Road Federation. This represents the most comprehensive summary available of basic facts about this country's roads and road transport.

* * *

A new type starter that is available for delivery ex-stock is the subject of leaflet No. 598 issued by Brookhirst Switchgear, Ltd., Chester. The type YH contactor-break star-delta starter is for motors up to 20 h.p. at 400/440 volts, is designed for squirrel-cage motors and complies with B.S.S. 587. Prices are reasonable but are magnified by purchase tax of 100 per cent.

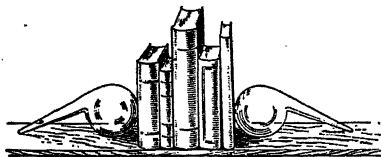


Thermostatic Bath No. 14026 by A. Gallenkamp & Co., Ltd., London, claimed to be silent in operation and giving efficient stirring. The all-glass container ensures good visibility and the rim is protected by rubber to eliminate the possibility of leakage

A new drying plant, primarily intended for horticultural crops, but capable of handling a variety of materials, has been produced by Bamag, Ltd., London. Described in the company's Bulletin No. D31, the Bamag spiral flotation drier operates on a pneumatic principle. The material is subjected to a two-stage drying process, first at a very high and then a moderate temperature, which avoids overheating. The plant has been found suitable for industrial residues of all kinds, including finely divided materials of high moisture content.

* * *

The October, 1948, issue of the journal of instrument engineering, *Technique*, published by Muirhead & Co., Ltd., Beckenham, Kent, is devoted to two articles. The first, by C. G. Garton, describes a Variable Air Capacitor of Zero Loss Angle. There are two photographs showing a general exterior view, and a sectional view with box and screens cut away to reveal the interior of the Muirhead Type D-14 precision capacitor. In the second article W. C. Lister deals in general with the principles of screening in alternating-current measurements under the title "Screens and Guard Rings in Electrical Measurements," part 2.



A CHEMIST'S

BOOKSHELF

Men of Stress. By Harley Williams.

London: Jonathan Cape III + 369. 15s.

"Out of perpetual self-conflict man builds his outer world in his own image." In this conclusion, with which few will quarrel, the author seeks to explain his theory of the forces which combine to produce those dynamic creatures whose mastery of the physical parts of our environment have brought to life industrial "empires" and the like. The further development of this theory, well expounded though it is, is not overwhelmingly convincing; but, as the rebutting evidence has no better claim to acceptance, the author's belief serves very well to introduce and associate three deeply interesting short biographies—of Andrew Carnegie, Lord Leverhulme and Woodrow Wilson. The man most nearly associated with the things we know was William Hesketh Lever, the Bootle soap salesman who transformed the economies of the soap industry—originally, we are told, by the judicious use of citronella oil—and thereby laid the foundations of the greatest aggregation of vegetable oil interests ever known. He performed apparent miracles in fields in which he was certainly no expert, as for example his conquest of the valley of the Congo to wrest from it great tonnages of palm kernels; and in that respect he and his two companions in this book defy all the simple, rational explanations. He had a daemon, as they did. Most will be content to have that mystic force undefined, finding sufficiently engrossing the picture here presented of an "ordinary" man who changed his whole life and environment and those of many thousands of others "... all in the way of business."

Spectroscopy and Combustion Theory. By

A. G. Gaydon. 2nd Edition. London: Chapman and Hall. Pp. xii + 242. 25s.

The first edition of this book appeared in 1942 (*THE CHEMICAL AGE*, 1942, 47, 156) and the fact that a new edition is now called for is an indication both of a general interest in combustion and of the value of Dr. Gaydon's introduction to the subject. Since the appearance of the previous edition, the bulk of published research on the spectroscopic investigation of flames has not been very great—although there are over 300 references in the new edition as against 258

in the first, only a couple of dozen of these concern work published since 1942. However, the advances have been sufficient to justify an increase of 50 pages. One completely new chapter, dealing with continuous spectra and the role of atomic oxygen in combustion, has been inserted. Other shorter interesting new sections deal with topics such as carbon formation in flames, flames containing oxides of sulphur; and portions of the chapter dealing with flame temperature constitute new contributions. The number of plates has been increased from two to four, and a useful addition is a separate brief description of each of the plates, apart from references to them in the text. It is perhaps unfortunate, however, that a certain amount of the detail appearing in the reproductions of the spectra in the first edition has been lost in the preparation of the new blocks. The appendix, which lists a number of the more important band spectra, has been considerably extended.

The remarks made in the review of the first edition, concerning the readability of this book, still hold good. Those chemists unfamiliar with the field, and wishing for a simple, straightforward and descriptive introduction to it will find Dr. Gaydon's book excellent. The new edition brings home strongly—indeed the more strongly on comparison with the first—just how much of this field still awaits investigation. Finally (and this must not be interpreted as adverse comment on either author or publisher, both of whom have done their jobs well) it is a regrettable reflection on present-day trends that an increase in size by approximately one quarter has resulted in an increase in price by three-sevenths of the original figure of seventeen and sixpence.

Textile Institute's 3779 Members

The Textile Institute has now issued the first post-war list of its members, incorporated in the first issue of the "Year Book of the Textile Institute." The last members' list was issued in 1938, and incorporated 1600 names. The current issue gives the names of 3779 members, and since it was compiled, a further 500 new members have joined.

Home News Items

Fire at Soap Works.—Damage estimated at £60,000 was caused by a fire at a soap works in Preston last week. The blaze was fed by glycerine, oils and fat, but a storage yard containing tanks of palm oil was saved.

Film on Ink Production.—Dr. F. A. Askew, chief research chemist of Coates Brothers Ink, Ltd., has been touring Scottish centres to show a sound film in colour on modern printing ink production and give a talk on "Recent Developments in Printing Ink."

Torch Battery Prices Increased.—The Board of Trade has revised maximum prices for home-produced electric torch dry batteries from November 22. Large unit cell batteries, standard flat batteries and large twin-cell cycle lamp batteries will be increased by $\frac{1}{4}$ d. to 1 $\frac{1}{4}$ d.

Highest Weekly Coal Output.—Production of deep-mined coal in Britain last week was the highest this year, although still nearly 300,000 tons short of the weekly average stated to be necessary to reach the 1948 target of 200 million tons. Comparative total figures are: Last week, 4,253,300 tons (deep-mined 4,052,000 tons, opencast 201,300 tons). Previous week: 4,245,800 tons (deep-mined 4,040,400 tons, opencast 205,400 tons).

Modern Heating Methods.—Coalite and Chemical Products, Ltd., staged an exhibition of modern heating methods in the Co-operative Hall, Colchester, Essex, on November 2 and 3. The show was officially opened by Capt. G. E. McCreery Kemball, local fuel overseer. Lectures on "Better Heating in the Home" were given by Mr. A. C. Hazell, member of the Institute of Fuel, and a well-known writer, lecturer and broadcaster on the coal industry.

Atmospheric Pollution.—The proposal is put forward in a letter to *The Times* by W. G. V. Balchin, King's College, Strand, London, W.C.2, that to prevent a repetition in this country of the asphyxiating conditions which are thought to have caused the death of 18 people in Donora, Pennsylvania, recently, dangerous emissions from iron, steel and chemical factories in certain localities should not be permitted when inversion of atmospheric temperature at low level prevails. This condition, which is said to exist in one night in three, causes a horizontal dispersion of fume and smoke in a warm zone at relatively low level.

BCPM New Address.—The British Chemical Plant Manufacturers' Association is changing its address as from Monday, November 15, to 14 Suffolk Street, London, S.W.1. (Telephone: WHItchall 0766.)

New Northern Office.—Silentbloc, Ltd., and its subsidiary company, the Andre Rubber Co., Ltd., have recently opened northern headquarters at 11 Cloth Hall Street, Huddersfield, under the management of Mr. H. Clements assisted by Mr. K. Walker. The telephone number is: Huddersfield 5491.

Fell into Chromic Acid.—Mr. Malvern Davis, 34, employee at the Forber Metal Works, Willow Lane, Mitcham, last week, fell head-first into a tank of chromic acid, which was at a temperature of 102° F. He was taken to hospital, where he died from his injuries.

Tung Oil.—A question in Parliament addressed to the President of the Board of Trade elicited from Mr. Bottomley the reply that final figures were not yet available, but it was estimated that from the date when public purchase started until July, 1947, the average cost of tung oil ex-warehouse was about £246 per ton.

No Help for Industrial Housing.—The Morecambe Corporation has replied in the negative to an application by the general manager of the Shell Refining Company's Heysham plant asking if the corporation could provide suitable sites for the erection of aluminium prefabricated houses, which the company was willing to provide, for its "key" personnel. About a month ago the Shell company asked if the Morecambe authorities could provide a number of council houses for certain employees and this request was also refused.

New NHS Formulary.—The forthcoming publication of a new formulary for doctors and chemists to use in the National Health Service was announced by Mr. Hugh Linstead, M.P., secretary of the Pharmaceutical Society of Great Britain at a meeting of its South-West Metropolitan branch. He said the formulary had been prepared by a joint committee of the society and the British Medical Association and would be submitted by it to the Ministry for official adoption. It did not provide for cheap medicine but for good medicine.

Next Week's Events

MONDAY, NOVEMBER 15

The Chemical Society. OXFORD: Physical Chemical Laboratory, South Parks Road, 8.15 p.m. Alembic club lecture. Dr. J. S. Anderson: "The Chemistry of Semi-conducting Solids." SOUTH WALES, Swansea: University College, 6 p.m. R. P. Bell: "The Structure of the Boron Hydrides and Similar Compounds."

Electrodepositors' Technical Society. Northampton Polytechnic, London, E.C.1. Annual general meeting. Discussion: "Nickel and Chromium Plating," introduced by Norman Christie (Birmingham).

Manchester Federation of Scientific Societies. College of Technology, Manchester, 5.30 p.m. Wilde Memorial Lecture. Prof. L. Rosenfeld: "Conceptions of Force in Physics."

TUESDAY, NOVEMBER 16

Royal Institution of Great Britain. 21 Albemarle Street, London, W.1, 5.15 p.m. First of four lectures by S. F. Birch: "Recent Advances in the Chemistry of Hydrocarbons."

Institute of Metals. Metallurgical Club, West Street, Sheffield, 6.15 p.m. Dr. E. Crowan: "Plastic Working of Metals."

Society of Chemical Industry. Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W.1, 5.30 p.m. Second of the Baekeland Memorial Lectures. Prof. James Kendall: "Leo Hendrik Baekeland—and the Development of Phenolic Plastics."

WEDNESDAY, NOVEMBER 17

Royal Institute of Chemistry (London and South-eastern Counties Section). Film House, 142 Wardour Street, 6.15 p.m. Annual general meeting. Film: "Atomic Physics."

Manchester Metallurgical Society. Engineers' Club, 6.30 p.m. J. S. Blair: "Manufacture of Steel Tubes."

Institute of Fuel. Liverpool, 2.30 p.m. S. N. Duguid: "The Fight for Fuel Efficiency."

Society of Chemical Industry (Liverpool and North-western Area). Thornton, 6 p.m. H. F. Kenyon, S. G. Daniel and T. B. Lane: "Scuffing and Wear—Recently Developed Methods."

Institution of the Rubber Industry. College of Technology, Leicester, 7 p.m. Discussion. B. J. A. Martin: "Testing in the Rubber Industry."

THURSDAY, NOVEMBER 18

Royal Institution. 21 Albemarle Street, London, W.1, 5.15 p.m. First of three lectures by Prof. E. K. Rideal: "Selected Topics in Colloids—I."

The Royal Society. Burlington House, London, W.1, 4.30 p.m. Special general meeting (annual report of council).

Oil and Colour Chemists' Association. Royal Society of Tropical Medicine, 26 Portland Place, London, W.1, 7 p.m. G. N. Hillier: "Pumps and Pumping."

Institute of Welding (North London Branch). Polytechnic, Regent Street, W.1. O. Bondy: "Welding in Constructional Engineering."

The Chemical Society. EDINBURGH: North British Station Hotel, 7.30 p.m. Dr. R. P. Linstead: "The Chemical Research Laboratory, Teddington." HULL: Science lecture theatre, University College, 6 p.m. Prof. H. J. Emeléus: "The Preparation and Use of Radioactive Isotopes." NOTTINGHAM: University, 6.30 p.m. Prof. M. G. Evans: "The Mechanism of Free Radical Reactions Involved in Polymerisation." SHEFFIELD: University, 5.30 p.m. Prof. E. D. Hughes: "A Theory of Organic Reactions." SOUTH WALES, Cardiff: University College, 7 p.m. Prof. Wilson Baker: "The Chemistry of Penicillin."

Institution of Chemical Engineers. Birmingham, University, 4.30 p.m. Prof. F. H. Garner: "Extractive Distillation."

Textile Institute. MANCHESTER, 7.15. W. Howarth: "Aspects of Management." BELFAST: Queen's University, 7.30 p.m. Dr. R. H. Sloane: "The Electron Microscope."

FRIDAY, NOVEMBER 19

Royal Institute of Chemistry (London and South-eastern Counties Section). Geological Society, Burlington House, London, W.1, 6 p.m. Prof. J. C. Earl: Streatfield Lecture.

The Chemical Society. GLASGOW: University, 7.15 p.m. Tilden Lecture. Prof. C. E. H. Bawn: "The Reactivity of Free Radicals." SOUTHAMPTON: G. N. Osborn: "Recent Advances in the Use of Organic Reagents in Analysis."

Royal Institution. 21 Albemarle Street, London, W.1, 9 p.m. Prof. F. E. Simon: "Power Sources and Power Utilisation."

Sir John Cass Technical Institute (Department of Chemistry). Jewry Street, Aldgate, E.C.3. S. Baker: "Copper and its Alloys."

Institution of Chemical Engineers. Birmingham, University, 4.30 p.m. Prof. F. H. Garner: "Extractive Distillation."

Overseas News Items

Kenya Pyrethrum for America.—An agreement has been reached with the U.S.A. to dispose of the small unsold balance of this year's crop and a substantial part of next year's at 20 per cent increase on the present price. Pyrethrum insecticide is increasingly in demand in America.

Atomic Energy Decision.—The resolution inspired by Canada on atomic energy was last week approved by the General Assembly of the United Nations. The resolution asked the five great powers and Canada to continue consultations to try to find agreement on international control of atomic energy and prohibition of atomic weapons.

Giant Coal-Mining Machine in U.S.A.—A giant mechanical "mole" recently demonstrated at New Lexington, Ohio, U.S.A., is claimed to be capable of producing (in American mining conditions) up to 100 tons of coal a day, and to do the work of three other machines and 12 miners. It combines the work of cutting, drilling and loading and is equipped with automatic sprays to settle dust.

Eliminating Fluorine Gas.—Plans for the construction of a washing unit to eliminate fluorine gas present in smoke emitted from the Monsanto Chemical Company phosphorus plant at Monsanto, Tenn., have been outlined by Mr. Edward J. Bock, the company's plant manager. By treatment in scrubbing towers the gases from the sintering plant will be freed from fluorine, which process will neutralise. The project, including research, will cost about \$750,000.

University's New Laboratories.—The president of University College, Dublin, Mr. Michael Tierney, recently opened at the college a new laboratory of chemical technology. Prof. T. S. Wheeler explained at the opening ceremony that the laboratory would be known as the "Nolan" laboratory in remembrance of the late Prof. T. J. Nolan, whose untimely death had prevented him putting into operation plans he had formulated for the teaching of chemical technology in the college. Mr. Tierney also opened a laboratory for final years' honours chemistry, which will be known as the "Ryan" laboratory in remembrance of the late Prof. Hugh Ryan, the first Professor of Chemistry in University College, Dublin.

Saudi-Arabian Oil Rights.—Reports from the U.S. state that the American Independent Oil Company has taken over the oil rights in the Saudi-Arabia-Kuwait neutral zone. The area covers some 2000 square miles and is believed to have rich oil potentialities.

New Swedish Phosphate Plant.—More than 25 per cent of Sweden's requirements of phosphates for fertiliser are expected to be supplied by the new plant of A. B. Forenade Fosfatfabriker, Norrköping. Production, which started last month, will ultimately concentrate on granulated phosphate.

Anglo-French Oil Agreement.—Under the terms of a recent agreement within the limits of the intra-European payments of the OEEC, France is to obtain for the year ending June 30, 1949, 2.5 million tons of crude oil from the Middle East, the sterling for payment being advanced by Britain. In return, French refineries undertake to refine for Britain 1.5 m. tons of oil supplied by the Anglo-Iranian Oil Company.

C.I.L. Spends \$24 Million.—R. W. Sharwood, vice-president and treasurer of Canadian Industries, Ltd., states that total expenditure on plant extensions and improvements between 1939 and 1947 inclusive was about \$24 million. During 1947 the company started work on extension of the cellophane plant, estimated to cost \$4 million, and of the nylon plant, estimated to cost about \$600,000. Other important projects undertaken during the period: the paint plants at Montreal and Toronto, \$2.8 million, and the sulphuric acid plant, Hamilton, Ontario, over \$1 million.

Network Analyser for India.—Reflecting the acceleration of industrial development in India, an a.c. network analyser, for installation at the Indian Institute of Science, Bangalore, India, is now under construction at the U.S. General Electric Company's Philadelphia works. The instrument will be installed early next year in a new high-voltage laboratory, to be one of the most modern in Asia, and which will be part of India's engineering training programme. Among the instrument's many uses will include problems associated with the flow of liquid through a network of pipes, stress analysis, and vibration in machinery.

Personal

At the recent annual general meeting of the Fertiliser Manufacturers' Association, MR. E. P. HUDSON, assistant managing director of Scottish Agricultural Industries, Ltd., was elected president, and MR. J. K. CHURCH, of Sheppy Glue & Chemical Works, Ltd., was elected vice-president. At the first annual general meeting of the Superphosphate Manufacturers' Association, MR. W. G. T. PACKARD, vice-chairman of Fisons, Ltd., was re-elected chairman, and MR. D. H. REID, of the West Norfolk Farmers' Manure & Chemical Co-operative Co., Ltd., was re-elected vice-chairman.

Two young American chemical engineers received national recognition this week. They are DR. J. EDWARD VIVIAN, associate professor of chemical engineering at the Massachusetts Institute of Technology, Cambridge, Mass., and DR. ROY P. WHITNEY, research associate at the Institute of Paper Chemistry, Appleton, Wis., who have won the junior award of the American Institute of Chemical Engineers for their work on the absorption of chlorine in water.

DR. D. T. A. TOWNEND, who has been installed as president of the Institute of Fuel, was a collaborator with PROF. W. A. BONE (Melchett Metallist of the Institute, 1932) in research on gaseous combustion at high pressures. In May, 1946, he was appointed director of the British Coal Utilisation Research Association and became director general in 1947, a post which he now holds.

PROFESSOR JOHN READ last month celebrated his silver jubilee as professor of chemistry at the University of St. Andrews to which he came in 1923 from the chair of organic chemistry at Sydney University. A dinner to mark the occasion was given by members of the Chemical Society at which the president, MR. A. R. BATTERSBY, presided.

Appointed scientific liaison officer for Central Africa in the United Kingdom, MR. R. MCCHLERY has lately set up an establishment in the British Commonwealth of Nations Scientific Offices, Africa House, Kingsway, London.

MR. WILLIAM MARTIN, manager of the Dundvan Iron and Steel Works, Claremont, Coatbridge, Lanarkshire, left £51,778.

The Archbishop of York (DR. C. F. GARBETT) visited Port Sunlight last week, accompanied by the Bishop of Liverpool (DR. CLIFFORD MARTIN) and the Bishop of Chester (DR. D. H. CRICK). They were welcomed by Lord Leverhulme and toured the Lever Bros. factory and the village.

MR. T. MERVYN JONES, town-clerk of Newport (Mon.), has been appointed Gas Council chairman of Wales at a salary of £4500, with £500 a year expenses. He is one of the 12 chairmen of Area Gas Boards whose names have been announced by the Minister of Fuel.

SIR ROBERT ROBINSON, president of the Royal Society, and MR. W. L. TREGONING, industrial adviser to the Finance Corporation for Industry, Ltd., have joined the board of Petrochemicals, Ltd. SIR ROBERT ROBINSON has also joined the board of the associated company, Petrocarbon, Ltd.

M. HENRI VANDECAPELLE, director of l'Institut National de Verre, Charleroi, Belgium, recently visited the Triplex Safety Glass factory at King's Norton, Birmingham. He also studied production of chemical and other glass apparatus at the factory of the firm's subsidiary company, Quickfit & Quartz, Ltd.

MR. W. M. V. ASH, until recently general manager of the United British Oilfields of Trinidad, Ltd., this month succeeds MR. P. M. FOWLIE as president of the Shell Company of Canada, Ltd. Mr. Fowlie is joining the Shell group in London.

MR. F. J. CLAY, of F. J. Clay & Son, Ltd., was re-elected president, and MR. L. D. MACK, of International Toxin Products, Ltd., was re-elected vice-president at the recent annual general meeting of the Horticultural Fertilisers' Association.

MR. F. HERON ROGERS and MR. D. G. RANDALL have entered into partnership as consulting engineers at Budge House, 181 Queen Victoria Street, London, E.C.4.

MR. J. B. D. ROBINSON has been appointed chemist, Department of Science and Agriculture, Barbados.

DR. PAUL MOLLER, of Basle, is to be awarded the Nobel prize for medicine in recognition of his discovery of the insecticidal effect of DDT.

The Nobel Awards

Recognition in Physics and Chemistry

THE Royal Swedish Academy of Science on November 4 awarded the Nobel prize for chemistry to **PROF. ARNE TISELIUS**, of Upsala University, Sweden. The prize for



Prof. Arne Tiselius

physics was awarded to **PROF. P. M. S. BLACKETT**, of Manchester University.

Prof. Tiselius's prize is in recognition of his electroforetic and absorption analytical work, and especially of his discoveries of the nature of serum proteins. He was granted the personal status of professor and emoluments to enable him to continue research too specialised to justify the foundation of a chair. He was made a member of the New York Academy of Science in 1943.

The award to Prof. Blackett is in acknowledgment of his development of the Wilson cloud chamber method of tracing the tracks of swift atomic particles and of his discoveries in nuclear physics. He has been Langworthy Professor of Physics at Manchester University since 1937. He was a member of the Government's Advisory Committee on Atomic Energy and is the author of the recently published work "Military and Political Consequences of Atomic Energy."

Former Shell Chairman

The death was reported at his home near Banbury on Monday of Viscount Bearsted, who was chairman until 1946 of the Shell Transport & Trading Company, an office in which he succeeded his father in 1921. Aged 66, Lord Bearsted had a distinguished career in industry, finance and public affairs and filled many public offices in the City of London. He served with distinction in the 1914-18 war and was awarded the Military Cross.

Parliamentary Topics

Linseed—Potash—Iron and Steel

Linseed.—In reply to a question by Mr. Turton, Mr. Strachey (Minister of Food) said the Government had just bought 20,000 tons, with a possibility of a further 10,000 tons, of linseed from Uruguay. Shipment was to be made before December 31. Sir Frank Sanderson asked, in view of the considerable reduction in the price of cereals in America and other parts of the world, and the likelihood that oil seed prices would also be reduced, if the Minister would give an assurance that he would not enter into any long-term contracts without a break clause. Mr. Strachey said he could not give a sweeping assurance of that kind, but these considerations would be taken into full account in any short- or long-term purchases that the Government made. Sir Waldron Smithers asked the Minister if it would not be much better for the consumer if the Minister would stop bulk purchasing and State trading and allow Mincing Lane and the Baltic Exchange to get on with the job in healthy competition—to which Mr. Strachey replied in the negative. In reply to a question by Mr. Erroll, the Minister said he understood that the International Emergency Food Council had already announced that linseed and linseed oil were freed from allocation.

Potash.—A question by Brigadier McClellott addressed to the Minister of Agriculture brought the reply from Mr. G. Brown that all Britain's potash came from abroad, but, provided that imports arrived as arranged, there should be sufficient to meet farmers' requirements for the 1949 season. Asked by Mr. Peter Roberts if the Minister was not aware that a large amount of potash was available in Germany, Mr. Brown said he understood that only a small amount was available in the bizon, and that was what Britain was, in fact, getting.

Iron and Steel Companies (Overseas Subsidiaries).—In reply to a question by Mr. Erroll, Mr. G. R. Strauss (Minister of Supply) said he would circulate in the official report the names of the following companies which, according to his present information, had wholly-owned overseas subsidiaries: Guest, Keen & Nettlefolds, Ltd.; Hadfields, Ltd.; John Lyssaght, Ltd.; John Summers & Sons, Ltd.; Richard Thomas & Baldwins, Ltd.; Stewarts & Lloyds, Ltd.; the Millom & Askam Hematite Iron Co., Ltd.

MR. JOHN HAMER, who died suddenly on November 6, was a director of the Strawson Chemical Co., Ltd., London, manufacturers of insecticides, fungicides and allied chemicals, and of several other companies.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ACETEX, LTD., Newcastle-on-Tyne. (M., 13/11/48.) September 28, series of £1000 debentures, present issue £800; general charge.

CROWN CORN OIL CAKE & CHEMICAL MANURE Co., LT (formerly CROWN CORN FEED CAKE & CHEMICAL MANURE Co., LTD.), Hull. (M., 13/11/48.) September 29, mortgage, to Midland Bank, Ltd., securing all moneys due or to become due to the bank; charged on land and property at Maxwell Street, dwelling house corner of Stoneferry Road, and Maxwell Street, Hull, with machinery, fixtures, etc., and general charge. *Nil. November 19, 1947.

CRYSTYL CHEMICAL Co. (LEE GREEN), LTD., London, E.C. (M., 13/11/48.) October 14, £2150 debenture, to S. H. Harvey, Nottingham; general charge. *Nil. December 24, 1945.

KELRO CHEMICAL Co., LTD., Rushden. (M., 13/11/48.) October 11, resolution approving a charge registered December 30, 1946, to Barclays Bank, Ltd., securing all moneys due or to become due to the bank; charged on Polygon Works, Irchester. *— June 24, 1947.

MERRIGLO (PASTICS), LTD., London, S.W. (M., 13/11/48.) October 8, £3000 second debenture, to L. N. Henderson, Radlett; general charge. *£3000. December 23, 1947.

METROPOLITAN PLASTICS, LTD., London, E. (M., 13/11/48.) October 11, £7500 mortgage, to Scottish Temperance & General Associate Co., Ltd.; charged on 17, 18, 19 and 20 Glenville Grove, Deptford. *— June 2, 1948.

POULTEN, SELFE & LEE, LTD., London, E. (M., 13/11/48.) October 11, £4800 charge, to Hastings Permanent Building Society; charged on four new houses in Fifth Avenue, Wickford. *— June 22, 1948.

WELDING PLANT, LTD., Chichester. (M., 13/11/48.) October 6, £2000 second debenture, to J. E. Hutton, West Wittering; general charge. *Nil. April 26, 1947.

Satisfactions

AMBER CHEMICAL Co., LTD. (formerly AMBER SIZE & CHEMICAL Co., LTD.), London, S.W. (M.S., 13/11/48.) Satisfactions October 8, of debentures, registered March 2, 1907, and May 23, 1908.

BORDESELEY RUBBER Co., LTD., Birmingham. (M.S., 13/11/48.) Satisfaction October 18, of mortgage registered August 14, 1935, to the extent of £2000.

Receivership

MONO-PLASTIC CHEMICALS, LTD., 19 Grosvenor Place, S.W.1. (R., 13/11/48.) Mr. A. A. Henley, 19/20 Grosvenor Place, S.W.1, was appointed receiver and manager on September 29, 1948, under powers contained in debentures dated January 19, March 19 and August 17, 1948.

Company News

The name of Dyetex (Scotland), Ltd., has been changed to Tintex Dyes (Scotland), Ltd.

The name of Pulmer Lime Co., Ltd., 103 Cannon Street, E.C.4, has been changed to Fortis Quarries, Ltd.

The following increases in registered capital are announced: Bourn Chemical Industries, Ltd., from £7500 to £15,000; Damancy & Co., Ltd., from £5000 to £7300; Ferris & Co., Ltd., from £100,000 to £200,000; Happé Products, Ltd., from £5000 to £10,000.

Glaxo Laboratories, Ltd., Greenford, Middlesex, announces profits for the nine months ended June 30, 1948, amount to £976,101. After provision for taxes, etc., the directors recommend a final dividend of 4s. 10½d. per 10s. unit of ordinary stock, less income tax, payable on December 31, leaving a balance of £168,097 to be carried forward.

Chemical and Allied Stocks and Shares

STOCK market business has been at a better level, recorded dealings reaching their highest for some months, and a further general advance in British Funds has also stimulated the industrial and other sections. It is being assumed that the U.S. election result means there is unlikely to be any big modification of the Marshall Aid programme. Moreover, now the Government's "compensation" plans for steel shareholders in the event of nationalisation have been announced, the City view is that the outlook for markets is more clearly defined, some of the major uncertainties having been removed.

Hopefulness appears to be developing



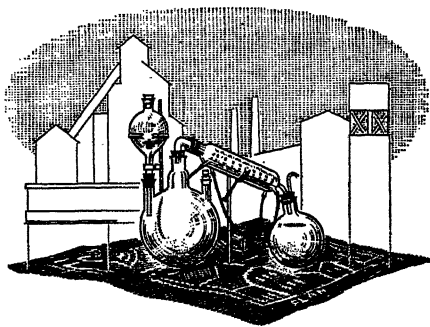
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that, owing to the need for increasing production, and the fact that American advice is being sought in this connection, the "streamlining" of controls now announced are the first moves in a programme which may restore an important measure of freedom to industry next year.

Chemical shares were inclined to respond to the control "streamlining" measures so far announced. Imperial Chemical further strengthened to 48s. 10½d., Laporte Chemical 5s. units have changed hands over 21s., Fisons over 59s., while Lawes Chemical 5s. shares were close on 14s. the full results creating a good impression. Annual statement of the chairman shows that Lawes Chemical has now obtained licences to proceed with its plans for a big new sulphuric acid plant which will require considerable capital expenditure over the next three years.

Amber Chemical 2s. shares were 9s. 9d., Albright & Wilson 5s. shares 30s. 6d., and there was again more business in Burt Boulton & Haywood up to 28s. Boake Roberts 5s. shares changed hands over 32s. and in other directions William Blythe 3s. shares transferred around 20s. The 4s. units of the Distillers Co. were favoured because of the group's big chemical and other interests, and strengthened further to 29s. 6d. Elsewhere, Goodlass Wall 10s. ordinary improved to 36s. 3d. and paint shares generally moved higher, partly because of relaxation of controls in respect of some plant and equipment used in the industry.

Another good feature was a rise in Glaxo Laboratories shares to £18½, the financial results creating a favourable impression. Dunlop Rubber at 75s. 6d. were good, Triplex Glass 10s. ordinary 24s. and Turner & Newall transferred over 78s. while British Aluminium were firm at 47s. 9d. on market expectations that the prospects in connection with the issue of £1,500,000 of additional 3 per cent debentures (offered to £95) will provide interesting information of the company's progress and expansion plans. Rise in British Match shares to 34s. reflected hopes that the Swedish Match Co. may shortly resume dividends.

Iron and steel shares were sold by holders wishing to get out of shares in companies threatened by nationalisation; but were bought by some of the big financial institutions because steel shares have attractions for those who wish to have a long-term option on British Funds. If steel nationalisation goes through, steel shares will be exchanged into British Steel stock on the basis of take-over valuation and the general level of British Funds at or after May 1, 1950. A number of shares, notably Thomas & Baldwins at 15s. 3d., Consett 15s. 4½d.,

Lancashire Steel at 35s. 3d. and Dorman Long at 33s. 6d. have now reached or exceeded their estimated take-over levels. In other directions, British Oxygen shares were strong, changing hands over £5, and Borax Consolidated rose further to close on 64s. Boots Drug were good at 56s. 6d. but Aspro shares slumped to 30s. 7½d. on the dividend "cut." Oils revived, Shell, Burmah and Anglo-Iranian all improving, while Trinidad Leasehold's 5s. shares at 31s. 6d. were firm on the big deal whereby the Regent Oil Co. has acquired the installations and distribution facilities in this country of Russian Oil Products, which marketed "R.O.P." petrol in pre-war years.

British Chemical Prices

Market Reports

STEADY trading conditions continue in most sections of the industrial chemicals market and the demand both for home and export account is well maintained. There are no important price changes to record on the week. The modification of Board of Trade Controls, announced by the President of the Board of Trade last week, covers a number of chemical products but the position of these products is unlikely to be greatly affected. Business in the coal-tar products continues on a fair scale.

MANCHESTER.—The news of the lifting of the price control in respect of acetone and certain other chemical products, announced towards the end of last week, has been received with interest on the Manchester chemical market, but up to the present actual quotations for the products in question seem to have been little affected. The past week witnessed a steady call for deliveries of the alkali and other leading chemicals against orders already placed, and fresh inquiries have been circulating satisfactorily, both from home users and from shippers. In fertilisers, new business during the week in superphosphates and other classes has been on a fair scale. Tar products maintain a firm price front and a steady call for supplies of most descriptions has been reported.

GLASGOW.—Business has again been brisk in the Scottish chemical market during the past week, reflecting the improved tone throughout industry in Scotland. At present there is a shortage of carbon tetrachloride, six weeks often being required for delivery. The demand for this material has been steadily increasing since the beginning of the year. Apart from this, the supply position has been well maintained. In the export market business has also been good, and the gradual easing of controls is of great assistance.

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Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2. at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Process for the production of dimeric condensation products from unsaturated aldehydes.—Distillers Co., Ltd., R. H. Hall, and K. H. W. Tuerck. March 4, 1946. 608,985.

Methods of waterproofing textile materials and compositions therefor and methods of making the said compositions.—C. E. Every. (Titanium Alloy Manufacturing Co.) March 4, 1946. 609,002.

Measuring apparatus for measuring high pressures.—C. E. Johansson A/B. March 3, 1945. 609,045.

Process for the stabilisation of keratin solutions obtained by treating keratin-containing material with aqueous solutions of alkali metal sulphides.—Nederlandsche Centrale Organisatie Voor Toegepost-Natuur-Wetenschappelijk Onderzoek. Nov. 10, 1942. 609,047.

Process for polymerising together a plurality of polymerisable substances in the emulsified state.—N.V. De Bataafsche Petroleum Maatschappij. March 23, 1944. 608,921.

Process for manufacturing a product soluble in water from natural rubber, gutta percha, balata and other natural rubber-like products.—N.V. De Bataafsche Petroleum Maatschappij. April 8, 1943. 608,922.

Manufacture of alkyl pyridines.—Phillips Petroleum Co. Dec. 11, 1944. 609,059.

Insecticidal compositions.—Pest Control, Ltd., and C. H. Barker. March 5, 1946. 609,073.

Vulcanisation of natural or synthetic rubber.—B. F. Goodrich Co. March 10, 1945. 609,086.

Stable solid compositions for use in preparing cleansing and disinfecting solutions.—Mathieson Alkali Works. May 24, 1945. 608,923.

De-icing of refrigerating plant.—J. C. Arnold. (Standard Oil Development Co.) March 5, 1946. 609,090.

Preparations of 2-(*p*-amino-benzenesulphonamido)-pyrimidine.—Soc. Des Usines Chimiques Rhône-Poulenc. April 13, 1945. 609,094.

Method of and means for cooling and so setting gelatine and like colloidal substances.—E. G. Wilson. March 6, 1946. 609,098.

Plant for the heat treatment of peat and lignite and like materials.—C. O. Rasmussen. March 6, 1946. 609,122.

Hydrogenation of halogenosilanes.—British Thomson-Houston Co., Ltd. March 15, 1945. 609,134.

Herbicidal compositions.—E. I. Du Pont de Nemours & Co. March 7, 1945. 609,137.

Synthetic linear polymers.—E. I. Du Pont de Nemours & Co. March 6, 1945. 609,138.

Chlorinating synthetic rubbers.—Wingfoot Corporation. Oct. 25, 1945. 609,154.

Alpha, beta-dehaloacrylates and polymers.—Wingfoot Corporation. Nov. 19, 1945. 609,156.

Preparation of alkyl esters of α -(2-(4-carboxy)thiazolidinyl)phenacetic acid and derivatives thereof.—Lederle Laboratories, Inc. April 4, 1945. 608,925.

Process for removing carbon monoxide from gases containing the same.—N.V. De Bataafsche Petroleum Maatschappij. Oct. 19, 1943. 609,166.

Manufacture of artificial fibres.—Bakelite Corporation. March 17, 1945. 609,167.

Apparatus for the determination of the water content of fuel and lubricating oils.—Sir J. Kingcome, W. Killner, and C. J. Gray. March 8, 1946. 609,170.

Preparation of alkylhalogenosilanes.—British Thomson-Houston Co., Ltd. March 15, 1945. 609,172.

Alkylation of halogenosilanes.—British Thomson-Houston Co., Ltd. March 15, 1945. 609,173.

Polyethylene-oxidation inhibitor.—Bakelite Corporation. March 17, 1945. 609,177.

Stabilisation of cyanhydrins.—E. I. Du Pont de Nemours & Co. March 9, 1945. 609,184.

Plastic mouldings having metal inserts.—A. Benn, and H. G. Allen. March 8, 1946. 609,189.

Production of coloured artificial textile materials.—British Celanese, Ltd. March 14, 1945. 609,197.

Polystyrene composition and methods of making the same.—Standard Telephones & Cables, Ltd. May 21, 1945. 608,835.

Liquid measuring and dispensing apparatus.—Avery-Hardoll, Ltd., and J. Fraser. April 25, 1946. 609,840.

Manufacture of hydrocarbon copolymers.—C. Arnold. (Standard Oil Development Co.) May 10, 1946. 608,012.

Method for the extraction of casein from seeds.—Courtaulds, Ltd., and R. L. Wormell. Aug. 28, 1946. 609,018.

Production of organic nitrogen compounds. I.C.I., Ltd., and C. W. Scaife, and H. Baldock. [Legal representative of H. Baldock (deceased).] Dec. 11, 1944. 609,022.

The Chemical Age

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Atomic Deadlock

THE CHEMICAL AGE since 1945 has devoted to the problems of atomic power no more attention than has been given to many other subjects which influence about as directly the shape of chemical affairs of the future. For three years reports on what atomic energy is achieving, most usually in America, have consisted very largely of forecasts, of which many have been contradictory, and there has been very little encouragement for the chemist to turn from the urgent preoccupations of his own science to study what will ultimately be the effect upon it of what is now being done by the international groups of nuclear physicists. It has been conspicuous, too, that, had chemists as a whole displayed an avid interest in what the sister science was doing that would probably have been short-lived, so hedged about with secrecy has the whole subject become. In recognition of this and of the evident existence of more urgent problems in chemistry than can be adequately dealt with the chemist has had every encouragement to let sleeping dogs lie.

Now this policy, like so many other comfortably negative decisions, threatens to be rendered untenable by the pressure of events, which seem to conspire to oblige chemists, in common with nearly all other scientists, to take one side or another. There are several to choose from and many of them are too extreme to permit dispassionate views to be held about them.

It would be idle to pretend that no branch of the sciences has in the past produced controversial subjects sufficiently provocative to introduce apparent chasms between fellow workers, but in the present partisanship associated with atomic energy there are new and disturbing elements. The evidence of this is contained in the book* in which Prof. P. M. S. Blackett, whose distinguished services to atomic science gained him this year's Nobel Prize in physics, seeks to assess what are the destructive powers of atomic energy and to indicate how they should be prevented from being turned upon their originators. The peculiarities of this book, as of some other pronouncements by scientists on the same theme, are the strange absence of scientific impartiality and a readiness to adopt axioms whose validity has not been established. Thus, if Prof. Blackett is right, the atomic bomb is a weapon whose decisive potentialities have been grossly overestimated, and he seeks to support this view of such weapons by reference to the fact that German war production continued to increase up to 1944, in spite of the Allied bombing offensive. It is surprising that anyone of Prof. Blackett's scientific training should be content to accept that as conclusive evidence of the ineffectiveness of bombing and its relation to atomic bombardment is not

* "Military and Political Consequences of Atomic Energy," Turnstile Press, Ltd. 21s. pp. 12s. 6d.

On Other Pages

Leader :		<i>Treating Industrial Effluents</i> ...	686
<i>Atomic Deadlock</i>	675	<i>Minimising Laboratory Risks</i> ...	688
Notes and Comments :		<i>Molybdenum Blue</i>	689
<i>Pretext for Nationalisation</i> ...	677	<i>Catalytic Gas Reactions</i>	690
<i>Verdict of Industry</i>	677	<i>Liquid Fuel from Coal in S. Africa</i>	690
<i>Petroleum-Based Detergents</i> ...	677	<i>Absorption, Distillation and Catalysis</i>	691
<i>Ammonium Nitrate</i>	678	<i>Industrial Synthesis of Urea</i> ...	692
Technician's Part in Promoting Out-		<i>Chemical History was Made in</i>	
<i>put</i>	678	<i>Wigan</i>	694
<i>Official Tests of NH₄NO₃</i>	679	<i>Quick Detection of Dangerous</i>	
<i>Union Secretary Seeks Injunction</i> ...	679	<i>Vapours</i>	695
<i>£500,000 Contract from U.S.S.R.</i> ...	679	<i>German Chemical Prospects</i> ...	696
<i>U.S. Capital for Palestine</i>	680	<i>Some Revival</i>	696
<i>Sicily's Fertilisers</i>	680	<i>War Confiscation Challenged</i> ...	696
<i>Sheffield on its Mettle</i>	680	<i>Austrian Control of Pharmaceuticals</i>	696
<i>Coal Tar Liquid Fuels</i>	681	<i>I.G.F. Plant in the U.S.A.</i>	697
<i>Raw Material Utilisation</i>	681	<i>New Phosphorus Facilities</i>	697
<i>Atomic Benefits Overvalued?</i>	682	<i>Technical Publications</i>	700
<i>Multiple Uses of Copper Compounds</i>	683	<i>Progressive Trends in Argentina's</i>	
<i>Cooling of Circulating Waters</i> ...	684	<i>Research</i>	704
<i>Chemistry and Public Health</i>	685		

very conclusive. One atomic bomb, he considers, would be equivalent to 2000 tons of high explosives. Whether or not that is a true comparison, Prof. Blackett is very willing to foresee that a possible result of the present conflict between the U.S.S.R. and the U.S.A. over the control of fissionable material might first be the widespread destruction of Western Europe. These are some of the grounds upon which he seeks to discredit the majority decisions reached by the UN Atomic Energy Commission and to support some of the "arguments" made familiar by U.S.S.R. spokesmen.

The most arresting circumstance in all this is the fresh evidence it produces of the fatal fascination which this subject exerts upon scientists to forsake their

traditional strongholds to take up positions which they seem but poorly qualified to defend.

At the other extreme is the attitude taken by Mr. R. F. Harrod, the economist, who favours relegating to the scrap heap all that has been achieved, beneficial and otherwise in the science of atomic fission rather than encourage any longer the apparently irreconcilable divisions between nations (page 682 of this issue). Unlike Prof. Blackett, however, he has no doubt at all with whom lies the responsibility for having made of atomic science a source of bitter and dangerous antagonisms and he will receive from the Soviet Press none of the acclamation which it is stated is now being lavished upon Manchester University's Professor of Physics.

Monsanto's New Interest

Monsanto Chemicals, Ltd., announced this week that it has acquired control of Silicon (Organic) Developments, Ltd., whose development work of modified forms of silicate esters has been noteworthy. Ethyl silicate has been of importance in precision casting, especially of such items as turbine blades for jet propulsion systems.

The new registered offices of Silicon (Organic) Developments, Ltd., will be at 8 Waterloo Place, London, S.W.1, and the sales office Victoria Station House, S.W.1.

Shares Offered

Tenders are invited by the Board of Trade for the purchase, subject to the special conditions of sale, of 9997 shares of £1 each, fully paid, in E. Leitz (London), Ltd., 20 Mortimer Street, London, W.1, manufacturers of and dealers in optical, scientific and other mechanical instruments, also of 603 ordinary shares of £1 each, fully paid, in Inertol Co., Ltd., Courtney Street, Hull, manufacturers of waterproofing and anti-corrosive compounds.

NOTES AND COMMENTS

Pretext for Nationalisation

ANY lingering belief that the Government has been reserving for the propitious moment some argument in favour of nationalising the iron and steel industry less hollow than those already heard has been blown to shreds during the presentation by the Minister of Supply (Mr. G. R. Strauss) at the second reading in the House this week of what must be taken as being the entire Government case. Most of the arguments in support of the Bill bore unmistakable evidences that their parentage was political conviction and owed little or nothing to the conspicuous facts, both about the industry itself and about what have been the fruits of nationalisation in the only comparable industry. The Bill has been presented, we are told, because the industry cannot become "efficient enough or responsive enough" while it remains under private ownership. The overwhelming evidence to the contrary contained in the continual establishment of fresh output records (15.45 million tons in October as contrasted with 5.25 million tons monthly in 1932) and the willing co-operation which the companies have offered through the Iron and Steel Board has been studiously ignored, as have all the threats of disruption and disaffection within the industry on which the recovery of our economy so intimately depends. If there is any reason to believe that nationalisation here will be any less disastrous in its effect upon output, quality and prices than the dismal record of the nationalised coal industry the sponsors of this Bill have yet to present it.

Verdict of Industry

ADDUCING its reasons for its strong opposition to the Iron and Steel Bill, the National Union of Manufacturers—which represents some 7000 manufacturers and 55 trade associations—has summarised nearly all the principal objections which combine to make this Bill more objectionable than any of the other measures aimed at securing a greater degree of government control over basic industrial activities. This viewpoint carries even more weight perhaps than the more intimately informed criticisms emanating from the industry

concerned because it represents so many comparatively disinterested judgments. The NUM sums up: "As far as the National Union is aware, the promoters of the Bill have not attempted to show that at the present time it will increase production, add to efficiency or lower costs in the iron and steel industry. As the facts clearly prove, the industry is giving a vital and efficient service to the country in the shape of increasing output at prices which compare very favourably with those of other steel producing countries. . . . The Bill will aggravate the country's economic difficulties by introducing an unfortunate element of uncertainty into the iron and steel industry and in those industries dependent upon it, which must retard progress and reduce their effectiveness. The National Union was a party to the voluntary agreement by industry for the limitation of dividends and feels strongly that, in the light of that agreement, the basis of compensation laid down in the Bill cannot be justified on any grounds of equity. In this respect the Bill is, in the opinion of the National Union, a blow to savings, to investment and consequently to industrial development."

Petroleum-Based Detergents

THE links between the chemical engineer and plant manufacturer and the public health services are traditionally of the closest kind, and modern trends in industry and in social organisation are making that dependence even more intimate. That was evidenced at this year's Public Health and Municipal Engineering Exhibition, of which the more interesting aspects were associated with the marked progress which has been made in the basic activities of water purification and the chemical handling of effluents. In the latter, it has been evident for some time that, without the aid of rapid and effective research, some of the new problems to which chemical industry's own ingenuity in providing synthetic detergents, plastics and a host of other synthetics has contributed might in the long run represent a serious barrier to wider development. The worst threat of that kind now seems to have been more or less averted, and there are good prospects that the re-

maining difficulties of coping with the "intransigence" of all the synthetic detergents now being increasingly used domestically and in industry will not be insuperable. At the stand of Shell Chemicals, Ltd., a representative of THE CHEMICAL AGE was told by a technical expert that there never had existed a real problem in regard to the application and use of petroleum based detergents except in connection with such industries as wool combing, with its effluent content of natural grease, and then only where, as in Bradford, there is a concentration of many firms in the one industry all using the same main sewers. Even that angle of the general problem is well on the way to being solved.

Ammonium Nitrate

THE enigma of ammonium nitrate's unpredictable transformation on occasions from a fairly stable fertiliser material to something closely resembling TNT in its powers of destruction has not been rendered any simpler by the fairly elaborate practical tests lately carried out by experts of the Home Office and some other government departments (page 679). Some hundred tons of NH_4NO_3 were ignited under varying conditions in confined spaces and subjected to treatment in comparison with which anything which could conceivably have occurred in the *Grand*

Camp at Texas City must seem insignificant. At one stage in the investigations, lasting several days, in the region of Heligoland, a plastic explosive was placed on a hatch cover over the reluctantly burning test cargo of ammonium nitrate and firewood and detonated from a distance; in another experiment cordite was included among the combustible material, which in the light of more than one tragic experience in the past might well have produced volcano-like results. On no occasion was there produced an effect that could in any sense be termed an explosion and the comparatively low temperatures recorded suggest that the rate of oxidation was not rapid. The criticism may possibly be raised that the purity of the ammonium nitrate did not permit an exact parallel with the industrial grades which have been the cause of disasters, in which the part played in supporting rapid oxidation by other materials accidentally incorporated seems to have been established. Paper sacks, which have been suggested as contributory to the worst accidents in the past, were, however, used in more than one of the tests. The scientific conclusions based on what was witnessed and recorded have yet to be made known; meanwhile a quick verdict would seem to be that the elusive factor which sometimes releases from ammonium nitrate that uncontrollable wave of destructive energy has not yet been identified.

The Technician's Part in Promoting Output

"IT would appear as if, in many cases, the people who were unemployed before the war are now employed with no real gain in output. That is, we have the condition of 'hidden' unemployment," stated Dr. H. E. North, of I.C.I., Ltd., Mossend, in a lecture entitled "The Technician and Productivity," which he gave in Glasgow recently to the Institute of Plant Engineers.

In terms of gross output per year the productivity of the metal production industry had increased by 33 per cent between 1935 and 1947, and that of the chemical industry by 18 per cent, but employment in these trades increased by 48 per cent and 62 per cent, with the result that the productivity per man employed had actually fallen by 10 per cent and 27 per cent respectively. The picture was not uniformly black, but the general position is one of deterioration.

Dr. North quoted from a booklet produced in America by the Machinery and Allied

Products Institute, which stated that the "American man-hour output ranges from 131 per cent to 597 per cent of the British . . .," but he pointed out that Sir Henry Tizard had suggested that the reason why the U.S.A. excelled us lay not in natural resources or in the quality or quantity of industrial research, but arose because she had a much greater percentage of men of high scientific education in executive charge of industry.

In this connection the lecturer said he had recently seen comparative data for the per-man-hour output of certain Scottish and English industries. The lower Scottish productivity was attributed to a number of factors; one which struck him was that the percentage of technical oncost workers was smaller per industry north than south of the border—i.e., the use of the technician did put up output as well as putting up overheads.

OFFICIAL TESTS OF NH_4NO_3

Persistent Failure to Produce an Explosion

RESearch into the preventing of explosions, in store and during transport, of ammonium nitrate, was carried a stage further, during the period September 29 to October 3, when three trials, arranged by the Explosives Storage and Transport Committee at the instance of a Home Office working party, took place on the island of Dune (Germany), near Heligoland, to examine the effects of fires on commercially pure bulk NH_4NO_3 .

The bunker in the first trial—states an official report prepared by Mr. W. A. Bailey, of the Ministry of Supply—was an underground concrete room 39 ft. long, 16 ft. wide, and 10 ft. high. Paper-lined drums containing ammonium nitrate (70 tons approximately) were placed lying on their sides along the length of the bunker in two lines, five drums high, leaving a central gangway about 4 ft. wide.

This gangway was filled with chopped wood (about 5 tons) and crushed ammonium nitrate (about 10 tons). At either end of the bunker a mixture of wood shavings and crushed ammonium nitrate was ignited by means of cordite, primed with a small quantity of incendiary composition, at 5 p.m. on September 29.

Too Hot to Enter

The fire was observed from 2 miles out to sea. Clouds of white smoke were first observed. The colour changed to brownish after about 1 hour and later appeared to die down. Later still flames were seen and after 80 minutes much brownish smoke was pouring out. Intermittent flames were seen for a further 5 hours. On the morning of September 30, the bunker was examined. It was found to be too hot to enter and the floor was covered with a hot concentrated ammonium nitrate solution.

On October 1 it was possible to carry out an examination of the drums near the entrance but the bunker was still too hot to enter. They were still in position but had bulged at the ends and some were split. Ammonium nitrate had obviously melted and run over the floor.

Gas samples and temperature measurements were taken during the course of the fire. The temperature was taken immediately below the ceiling about 25 ft. from the entrance. It rose rapidly to about 80°C . and then rose slowly for the next 6 hours (11 p.m.) to about 150°C . A rapid rise to 400°C . occurred in the next hour (midnight). It then dropped to about 250°C .

for 2 hours shot up to 350°C . for a short time (2 a.m.) and then gradually fell.

Visual observation suggests that the drums in contact with the fire had been raised to a red heat. Iron treads on the steps leading to the shelter also had been at red heat.

There was no evidence of any explosion having occurred.

Tiers of Drums

In the second test the lighter was built of steel and consisted of two holds separated by a steel bulkhead. Each hold was 25 ft. long, 19 ft. wide and about $7\frac{1}{2}$ ft. high. They were covered with 2 in. thick wooden hatch covers 15 ft. by $11\frac{1}{2}$ ft. Paper-lined drums were stacked on their ends two tiers high leaving about 5 ft. on either side of the bulkhead for the fire. Each hold contained about 40 tons of ammonium nitrate and 2 tons of wood mixed with 4 tons of crushed ammonium nitrate.

Ignition in each hold was effected as for the bunker at 1.35 p.m. on September 30. Clouds of white smoke appeared and continued intermittently for some time.

When the lighter was examined the following morning the after hold had been burnt out, but the forward hold was still smouldering with the hatch covers still in position but charred around the edges. After several hours, to accelerate burning, a charge of plastic explosive was placed on part of the hatches and fired by remote control. This was done at 6 p.m. on October 1, 1948. A large fire broke out which burned intermittently until about 11 p.m.

The following morning it had burnt out, but the temperature reached was obviously less than in the after hold. The drums were bulged and some were burst. Molten ammonium nitrate had poured into the fire space. The appearance of the steel deck and sides of the lighter suggested that they had been at red heat.

Again, there was no evidence of any explosion having occurred.

Paper Bags

The lighter CH.192 in the third test was built of steel and contained one hold 53 ft. long, 12 ft. wide, and $6\frac{1}{2}$ ft. high. It was covered with 2 in. thick wooden hatch covers. It was filled with 6-ply paper bags not treated with bitumen, each containing 90 lb. of ammonium nitrate, for 36 ft. of its length. The remaining 17 ft. of the hold was filled to a depth of about 3 ft. with a mixture of chopped wood and crushed

ammonium nitrate overlaid with more bags of ammonium nitrate.

The quantity of ammonium nitrate in bags was about 45 tons. The fire consisted of about 2½ tons of chopped wood mixed with about 5 tons of crushed ammonium nitrate.

The fire was started at the end of the hold at 4.36 p.m. on October 2, 1948. Clouds of brown smoke were soon observed and after about 30 minutes flames appeared. Intermitent flames with little smoke were seen for about 1 hour when owing to heavier seas the ship from which observation was being made had to run for shelter. There is evidence that the fire continued well into the night.

In the morning examination of the lighter showed that a fierce fire had taken place and approximately half of the ammonium nitrate had been destroyed. Masses of ammonium nitrate roughly of the same shape as the original bags were left in the end remote from the fire but little paper remained.

Gas samples and temperature records were taken from a point approximately half way along the lighter. The temperature record shows that the temperature rose in about 40 minutes to about 500°C. It fell to about 200°C. in the next ¾ hour and to about 100°C. in the next hour after which it fell to air temperature in 3 hours. The appearance of the steel deck and sides at the fire end of the lighter suggested that they had been at red heat.

Here again, there was no evidence of any explosion having occurred.

SICILY'S FERTILISER PLAN

A SCHEME is being put forward by sulphur interests in Sicily to utilise sulphur anhydride at present wasted in the sulphur furnaces of the island. It is suggested, in view of the proximity of the French African coast, an agreement could be reached between Italy and France to exchange the two products needed in the manufacture of hyperphosphate fertilisers: phosphorites and sulphuric acid.

At present Sicily consumes only 130,000 tons of hyperphosphates and 33,500 tons of nitrogen fertilisers yearly, but competent authorities state that total needs of the island are at least 650,000 tons of hyperphosphates and 150,000 tons of nitrogen fertilisers. Centralised production of such fertilisers in Sicily would, of course, greatly reduce the cost of manufacture.

Between August 1, 1947, and June 15, 1948, Italy produced 160,000 tons of sulphur, of which 70,000 tons were exported, mainly to France. Sicily produced 90,000 tons out of the total. Carbon disulphide is to be produced at Palermo and mercury production is to be increased to 2500 tons a year.

U.S. Capital for Palestine

Financial Aid for Plastics Industry

INDICATIONS of the close interest of some sections of American industry in the industrial and chemical development of Palestine are reflected in statements made in the U.S.A. last week.

Indicating the first step in the establishment of a plastics industry in Palestine, Mr. Robert Szold, chairman of the board of directors of the Palestine Economic Corporation, and Mr. Harry Levine, of Leominster, Massachusetts, announced the formation of Supercor Resinous Chemical Corporation, Ltd., to be incorporated in Palestine, among whose first activities will be the establishment of a plant for producing vinyl-coated fabrics for upholstery, luggage, waterproof-sheeting and handbags. Capital equivalent to £62,500 is stated to have been subscribed, and a group of New England plastic manufacturers including American Resinous Chemical Corporation, American Polymer Corporation, and H. Remis & Company are said to be participating.

Factory premises have already been obtained and machinery and raw materials have been ordered in the United States and are nearly ready for shipment.

The new enterprise will primarily engage in manufacturing plastics as raw materials for other industries.

Other reports state large-scale production of potassium sulphate and superphosphate is planned to begin shortly in Palestine. Other products being studied with a view to production include chlorhydric acid and fertilisers. Plastics will also be manufactured as a product of castor oil, the process having been discovered at the Weizmann Scientific Institute.

"Sheffield on its Mettle"

The "Sheffield on its Mettle" Exhibition, which was opened by H.R.H. Princess Margaret on Monday (November 15) in the Cutlers' Hall and is to continue until November 27, is a series of displays organised by the Sheffield Chamber of Commerce to promote the same objectives as a Pageant of Production taking place in the City Hall—to stimulate the drive for a greater output of the city's products.

There are representative selections of steel and steel products, tools and those kinds of cutlery which are used in trade and industry and are known in Sheffield as "cutlery tools of trade." Special attention has been given to the vital rôle that Sheffield steel makers have played in making possible the production of jet engines.

Raw Materials Utilisation

A Scottish Chemical Sub-Committee

FOR the purpose of promoting by advice and direct assistance the provision of new industrial applications in Scotland of chemical research, and to examine and advise on needs for additional chemical research facilities in Scotland, a new chemical sub-committee of the research committee of the Scottish Council (Development and Industry) has been formed.

The committee is already studying a number of proposals concerned to a large extent with the possible industrial utilisation of raw materials—agricultural, forestry, mineral, etc.—at present available in Scotland, but not fully used. Straw and waste timber are good examples.

If such materials could be more completely worked up, or transformed into commodities of higher value, the committee believes, greater supplies of badly needed materials would be provided without any expenditure of foreign currency, and with benefit to Scottish industry and employment.

A separate panel is being appointed consisting of persons who are known to be particularly well qualified to give assistance over a range of specialised branches of chemical technology. These authorities may be invited to join small groups of members of the sub-committee delegated to study certain subjects and to attend meetings of the committee when these matters are under discussion.

To Assess Industrial Prospects

The sub-committee has agreed that its procedure will be to gather together all existing information upon projects under investigation and to determine whether industrial application is likely to be successful. If so, it will bring its conclusions to the notice of parties likely to be able to put them into effect.

Although the committee itself cannot carry out research, it may be able to arrange for investigations to be carried through in cases where this appears to be necessary.

The members of the sub-committee are:

Chairman: Mr. W. J. Jenkins, Imperial Chemical Industries, Ltd., Glasgow; Mr. W. M. Ames, J. & G. Cox, Ltd., glue manufacturers, Edinburgh; Professor W. M. Cumming, Royal Technical College, Glasgow; Professor E. L. Hirst, Department of Chemistry, University, Edinburgh; Mr. B. G. McLellan, Edinburgh; Professor H. Nicol, West of Scotland College of Agriculture, Glasgow; Mr. W. G. Reid, Scottish Dyes, Grangemouth. Secretary: Mr. F. J. Bolton, J. F. Macfarlan & Co., Edinburgh. Assessors: Mr. E. A. B. Birse, Department of Health for Scotland; and Dr. H. Buckley, Department of Scientific and Industrial Research, Edinburgh.

Coal Tar Liquid Fuels

New Standard Characteristics

THE British Standard No. 503: 1933, relating to creosote for fuel in furnaces, has been brought up to date and incorporated in the new specification 1469: 1948, which also covers another type of coal tar fuel. Part I deals with the two grades of creosote CTF100 and CTF50, sold previously under 503: 1933; and Part II with a relatively new general purpose fuel known as creosote/pitch mixture, and as CTF200.

Full Consultation

The British Standards Institution has gone to some trouble to ensure that all interested organisations were represented. The supervisory body (Tar Products Industry Committee) consisted of members drawn from the Ministry of Supply, National Benzole Association, Association of British Chemical Manufacturers, Association of Tar Distillers, and Standardisation of Tar Products Tests Committee. The last three, together with several other bodies and individual manufacturers, were represented on the drafting committee.

Parts I and II of this standard specification describe briefly in 3½ pp. the scope, nature, properties, methods of test, and sampling and size of sample. The subject matter of appendices A to H, extracted mainly from the 1938 edition of "Standard Method for Testing Tar and its Products," published by the Standardisation of Tar Products Test Committee is as follows: determination of (a) viscosity, (b) fluidity of CTF100 and 50, (c) flashpoint, (d) gross calorific value (expressed as 15° cal. under conditions of constant volume for the products of combustion); (e) water, (f) matter insoluble in toluol; (g) coke residue by Conradson method, (h) ash.

Purity and Viscosity

Coal tar fuel 100, which has been known hitherto as creosote for fuel in furnaces and as creosote b, must be kept at a temperature over 90° F. to ensure fluidity during storage and handling. Coal tar fuel 50 (creosote a) remains liquid at 32° F. These two shall consist essentially of distillates free from petroleum oil, undistilled crude tars, inorganic acids, sediment and other impurities likely to choke equipment. CTF 200, already known as such, and as a creosote/pitch mixture, shall consist of a stable homogeneous coal tar product, practically free from inorganic acids, grit, and other impurities.

(Pp. 8 vo 22, price 2s. 6d., published by British Standard Institution, 24-8 Victoria Street, London, S.W.1.)

ATOMIC BENEFITS OVER-VALUED?

Economist Recommends a Standstill

THE suspension by all nations of the generation of nuclear energy for industrial power for a term of years was suggested by Mr. R. F. Harrod as a reasonable measure to minimise the dangers and complications entailed by its use. He considered the disadvantages were greater than the real or prospective benefits.

Mr. Harrod, who was statistical adviser to the Admiralty and to Mr. Winston Churchill during the war, was speaking on "The Economic Repercussions of Atomic Power," the third series of lectures on "The Atomic Age" being given under the auspices of the Sir Halley Stewart Trust at the Memorial Hall, Farringdon Street, E.C.

Dealing with the international difficulties, he emphasised that it was unlikely that Russia would ever consent to "foreign penetration" required by international control.

Regarding the benefits likely to be derived from atomic power, Mr. Harrod confined his observations to the use of power and heat, and excluded any reference to medical developments.

These benefits he divided under five heads, as follows:—

(1) Economies which might arise by the substitution of cheaper atomic power for other forms of mechanical power, i.e.: coal, oil, etc.

(2) Economies due to replacing of human or animal power by atomic power.

(3) Improvements in methods of production which might be made possible by the more convenient form in which the new power was presented for use.

(4) Radical changes in production which might arise from the use of massive cheap power.

(5) The possibility of the provision of new goods and services not hitherto enjoyed by man.

Under the first of these, said Mr. Harrod, even assuming atomic power and heat could be rendered wherever required more or less free of cost, the most favourable maximum increase in Britain's national income would be under 6 per cent.

Secondly, the economies made by substitution of mechanical for human power, even if the cost of the former could be greatly reduced, would be so trivial as hardly to be worth considering.

The third heading, he said, was more complex, as more information was needed. He quoted as a possible example of benefit the suggested construction of "atomic vessels," which would be able to travel faster, need less re-fueling, and have a quicker turn-round. He found it hard to believe that atomic energy could be transmitted in the near future in a form that would simplify productive processes. The complex problems of safeguarding workers and disposing of waste were extremely hard to overcome.

Possible savings under the fourth head were the most speculative of all. If, and only if, atomic power were very cheap could it be used massively and thereby revolutionise productive processes. The prospect of this was not hopeful.

About the prospects of new goods and services, he said, the imagination could run riot, but it was quite another thing to assess the solid benefits.

Union Secretary Seeks Injunctions

Representing the outcome in a dispute affecting the control of the Chemical Workers' Union, several interlocutory injunctions were granted last week to Mr. Bob Edwards, general secretary of the union, against Messrs. R. G. L. Bowyer, J. C. Lamb, Harold Lancaster, and A. Williams, and other members of the national executive council of the union. Hearing of the summonses was appointed to be before a judge in chambers this week. Mr. Edwards sought declarations on a number of matters including the validity of certain appointments to the national executive council and an attempt to suspend him (Mr. Edwards) from office as general secretary.

£500,000 Contract with U.S.S.R.

Two Peterborough Engineering companies are now engaged on a contract valued at nearly £500,000 to supply to the U.S.S.R. 24 transportable power stations. The companies are Peter Brotherhood, Ltd., and Mitchell Engineering, Ltd. Twenty-four Brotherhood transportable 500 kW steam turbo alternator sets and auxiliary equipment formed an item in the trade and payments agreements between the Government of the United Kingdom and the U.S.S.R., which were signed in Moscow on December 27, 1947. The contract is to be completed in 2½ years.

The water tube boilers to generate the steam are being manufactured by Mitchell Engineering, Ltd.

MULTIPLE USES OF COPPER COMPOUNDS

A Contemporary and Historical Survey

COPPER compounds were first used commercially against cereal seed diseases in the early part of the last century. Since then the diversity and effectiveness of their application has greatly increased. The field has now been comprehensively summarised in "Copper Compounds in Agriculture and Industrial Microbiology," published by the Copper Development Association.

Disease of crops is as old as agriculture and has caused enormous losses. The first recorded use of copper as a fungicide was by Schulthuss in 1761, when he steeped seed and grain in a solution of copper sulphate to check the bunt and smut which had such a ruinous effect on cereal crops.

The year 1885, however, was a milestone in the fight against plant disease, for it was then that Millardet introduced Bordeaux mixture, a solution of copper sulphate or "blue-vitriol" ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$) with a lime suspension, which proved a remedy for downy mildew of the vine. This led a little later to the discovery that mildews of a similar character on all kinds of plants could be prevented by small amounts of copper applied at the right time and in the right manner.

Paris green is probably one of the best known copper compounds in use to-day and is employed successfully in a number of different spheres. As an insecticide it is effective against the Colorado beetle, the apple and cotton boll weevils, and other pests. A use of chief importance to-day is its application in powder form to the surface of pools and stagnant waters

for the destruction of mosquito larvae.

A less well-known employment of copper sulphate is for the deficiency diseases of animals. Swayback of lambs, indicated by varying degrees of paralysis, is prevented by giving the ewes before lambing salt licks containing copper sulphate. This is only one of the many uses in animal husbandry.

Textiles and Timber

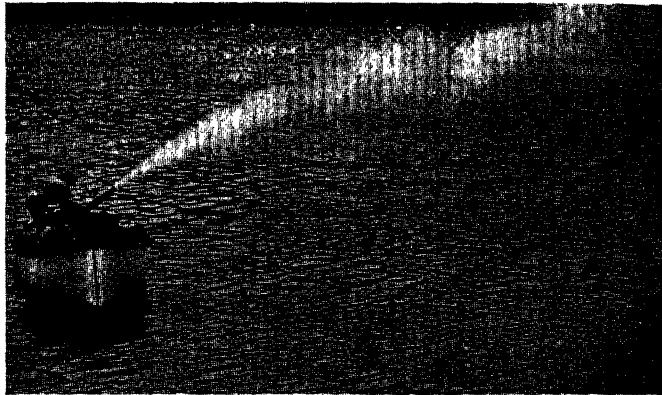
Textile preservation is yet another variation of the many activities of copper compounds. In rot-proofing, cuprammonium treatment has proved satisfactory, but copper naphthenate has the advantage over it as it does not affect the strength of the material.

Timber is always subject to attack by fungi and insects, and application of copper salts, especially naphthenate, is being increasingly employed for domestic uses where the odour of creosote would be objectionable. Out of doors considerable quantities of copper sulphate are being used in France for preserving telegraph poles.

Finally, copper sulphate plays an important rôle in the treatment of water reservoirs. Sprayed on the surface as a powder it kills the microscopic organisms which would otherwise affect not only the palatability but also prevent the filtration being effectively carried on.

The book is well printed, excellently illustrated and has a full index and bibliography. It may be obtained free of charge by those giving evidence of practical interest in the subject.

One of the less familiar services of copper sulphate, used here in bulk as a powder dispersion to destroy microscopic organisms in an American reservoir.



(By courtesy of the Water and Power Department of the City of Los Angeles, California)

Cooling of Circulating Waters

Basic Principles and Performance of General Equipment

THE relative advantages of the various devices used as coolers and condensers were described and assessed by Mr. J. Leyland in a paper entitled "The Cooling of Circulating Water for Coolers and Condensers," which he presented at a joint meeting of the north-western branch of the Institution of Chemical Engineers, the Chemical Engineering Group and the Manchester section of the Society of Chemical Industry, held at the College of Technology, Manchester, recently. Mr. E. J. Dunstan, vice-chairman of the north-western branch, presided.

The open type and louvred spray ponds, said Mr. Leyland, were atmospheric coolers and would cool water to between 12°F. and 15°F. above the wet bulb temperature of the air, depending upon the pond area, the temperature, humidity and velocity of the air, and upon the temperature of the warm water.

Cooling towers were classified as natural draught open and closed types, forced draught type, and combined natural and forced draught type, continued the speaker. The cooling grids, water distributors and collectors were similar for each type, but the housings differed. The water was distributed by open troughs or by nozzles of a modern, simple design. The sides of the natural draught open type were louvred over the whole height. This type of tower cooled medium quantities of water and was erected either at a distance from other buildings or was placed on a roof.

The stack of the natural draught closed type, explained Mr. Leyland, was enclosed by a wooden or concrete housing with open or louvred air inlets at the bottom. The sides of the forced draught tower were closed and one or more fans were placed below the banks of grids to provide forced draught of air. This type of cooler was smaller than the natural draught tower for a similar duty. The combined natural and forced draught tower used forced draught for high loads and natural draught for low.

Tubular coolers, made of coils, serpentines or banks of tubes, Mr. Leyland said, kept the circulating water clean. Coils and banks of tubes usually were immersed in ponds fed with river water, but serpentines were erected in the open air over ponds and cooling water was distributed over the outer surfaces of the tubes.

In the vacuum cooling process, continued the speaker, the warm water flowed into a vessel at a pressure equal to the vapour

pressure of the water at its desired final temperature. The water boiled and the vapour was ejected by a steam jet. Cooling might be done in two stages, each stage having a separate thermo-compressor which delivered the vapour to a condenser. This system would give circulating water at temperatures below those given by any of the before-mentioned types of cooler. The steam-driven ammonia refrigerator also would cool water to low temperatures.

Mr. Leyland graphically showed the variation of the operating costs per 1000 gallons of water cooled in the various types of cooler with the rates of flow of water and for various ranges of cooling. The temperature of the cooled circulating water determined the method of cooling, he said; the range and cost of cooling and the space available determined the type and size of the plant.

ASLIB CONFERENCE

"INTELLIGENCE—Some Fundamental Principles" will be the theme of an address by Dr. V. E. Parke, intelligence officer, Imperial Chemical Industries, Ltd., at the conference of the northern branch of the Association of Special Libraries and Information Bureaux which is being held in Newcastle-upon-Tyne on Tuesday, December 7.

Many large industrial concerns are members of ASLIB, a non-profit making organisation officially recognised by the Department of Scientific and Industrial Research. The organisation offers an information and book loan service; register of specialist translators; documentary reproduction service; publications, lectures and training courses.

Full particulars of the conference may be obtained from Mr. M. G. Cahill-Byrne, Vickers-Armstrong, Ltd., Central Technical Library and Technical Information Bureau, Elswick Works, Newcastle-upon-Tyne, 4.

Big Order for Oil Plant.—The Motherwell Bridge and Engineering Company, Ltd., have received a large contract for steel oil storage tanks and pipe-lines to serve the new oil field at Qatara, Saudi Arabia. The initial tankage will require 5000 tons of steelwork and the laying of 300 miles of pipe-lines. It is believed that the company will place sub-contracts to the value of £50,000 with other firms in the locality.

CHEMISTRY AND PUBLIC HEALTH

Important Services in Detergency and Water Purification

THE increasingly important functions of the chemist in the contemporary development of public health safeguards were fully represented at the Public Health and Municipal Engineering Exhibition at Olympia, London, this week, which portrayed better than any of its predecessors the essential services rendered by modern methods of water purification by chemical means, the effective treatment of effluents and some of the advances in public cleansing services which the newer synthetic detergents have permitted.

In his speech declaring the exhibition open on Monday, Mr. J. L. Edwards, M.P., Parliamentary Secretary to the Ministry of Health, said it had been gratifying to note the progressive reduction, in recent years, of water-borne diseases, which was in direct relation to the continuously improving water supplies, and was due largely to the work of the chemical engineers, whose profession was well represented at that exhibition. Their technical skill and achievement of the makers of equipment was fully appreciated, but he warned them that there was also the economy angle to be considered. What was possible technically was sometimes impossible economically.

Among the many exhibits of chemical engineering interest, that of Albright & Wilson, Ltd., 49 Park Lane, London, W.1, drew attention to their water-treatment phosphates, Calgon (sodium metaphosphate) and Micromet, and the dish-washing detergent Calgonite. The latter detergent contains, in addition to the usual detergent alkalis, a quantity of Calgon which prevents the formation of lime film and scum and diminishes bacteria counts.

New Detergents

The development of the new petroleum-based detergents was the main feature of the exhibit of Shell Chemicals, Ltd., 112 Strand, London, W.C.2. These materials, the product of research by the petroleum industry, are claimed with good reason to have changed entirely the approach to cleaning problems generally at a time when there is a world-wide shortage of soap and fats, and of the traditional fat-based detergents. The firm's recent research in this connection—a CHEMICAL AGE representative was told—has answered the criticism of petroleum-based detergents that they destroy the bacteriological processes involved in sewage digestion. The principal difficulty in respect of

such detergents has been associated with the wool-scouring plants of Bradford, and this arose because of the concentration of many factories of the same type in the one area using the same sewage system.

A modern chlorination house, containing all equipment necessary to protect a public drinking-water supply against pollution, including automatic residual controlled chlorination plant, formed one section of the display of Wallace & Tiernan, Ltd., Power Road, Gunnersbury, London, W.4. On this stand there was also an interesting exhibit of some museum pieces, showing the primitive methods which were used in early water-supply systems. Also shown by this firm was apparatus for the application of chemical solutions in the treatment of drinking, bathing and industrial waters, with large-scale drawings, flow sheets and photographs.

Chlorination

Imperial Chemical Industries, Ltd., recalled the continuous dependence upon liquid chlorine for the purification of public water supplies and swimming baths, with special reference to the break point method of chlorination, also for the treatment of sewage and trade effluents. Exhibits here of particular interest to municipal authorities were Chlorox, a specially prepared sodium hypochloride disinfectant, and the Gammexane insecticides.

Self-contained breathing apparatus, masks, respirators and smoke helmets, for use in harmful atmospheres formed the basis of the display of Siebe, Gorman & Co., Ltd., Neptune Works, Tolworth, Surbiton, Surrey, who are also makers of the "iron lung" and other medical equipment, as well as diving apparatus.

Chemicals used in the purification of water and for the treatment of sewage and trade effluents were well represented by Peter Spence & Sons, Ltd., National Buildings, St. Mary's Parsonage, Manchester, 3. Specimens included aluminium sulphate, in the various grades and qualities adapted for particular methods of dosage, comprising samples of "Aluminoferrie," sodium aluminate, as used primarily for water softening, calcium carbonate for the neutralisation of acid waters and for the adjustment of pH where necessary to afford the optimum conditions for clarification. This stand also provided an effective pictorial illustration of the effect of aluminium salts in the clarification of water.

The Department of Scientific and Indus-

trial Research represented very fully the work being carried on at its Building Research Station, at Garston, Herts., the Road Research Laboratory, at Harmondsworth, Middlesex, and the Water Pollution Research Laboratory, at Watford. At the last, important work being done for the prevention of pollution by oil, the treatment of waste waters from electroplating, and an automatic control unit for oxidation reactions were effectively represented by models.

Typical rotometers and velocity meters supplied for the measurement of cold and hot water, and other liquids, such as brine,

ammoniacal liquors, soap solutions, caustic liquors, oil, etc., comprised the exhibit of Cleveland Meters, Ltd., Trunk Road Engineering Works, Redcar, Yorks. Included in this exhibit were meters for feed water measurement for both land and marine boilers.

The exhibits of G. A. Harvey & Co. (London), Ltd., catering for the requirements of quarrying and mining engineering, showed a wide range of perforated metals for screening and filtering and many other purposes. This firm also specialises in the manufacture of plant for the chemical and oil refinery industries.

Methods of Treating Industrial Effluent

AMONG the papers read during the Congress was one on the opening day on "Recent Developments in the Treatment of Industrial Effluents," by Dr. B. A. Southgate, director of water pollution research, Department of Scientific and Industrial Research. The following were among the points he raised:—

In the biological treatment of sewage perhaps the most interesting developments during the past few years had been in the operation of percolating filters. One of the most interesting properties of these was the ability to oxidise many substances which might be thought at first sight to be markedly inhibitory to biological action.

In the manufacture of rayon by the viscose process one of the waste waters contained a relatively high concentration of sodium sulphides. At one time these were removed by precipitation, for example, as ferrous sulphide, but it was much cheaper and more convenient to treat the liquor in a percolating filter, when the whole of the sulphide was oxidised to thiosulphate or sulphate. These liquors, together with other treated liquors from viscose factories, were sometimes discharged to the sewers for further treatment at the sewage works.

Phenol, although markedly inhibitory to biological action in high concentrations, could be readily removed when present in

small concentrations and so also could formaldehyde, which was a constituent of waste waters from the manufacture of synthetic resins. Some of the liquors from the manufacture of synthetic resins contained high concentrations of phenols and other substances and could not be treated economically by biological methods; it seemed probable that recovery of the constituents in a useful form would prove to be a more economical process.

The anaerobic digestion of sewage sludge was now, of course, a well-established process and it seemed that the next advance might be in the more profitable use of the methane—for example as a raw material in chemical industries.

The most important waste waters from the carbonisation of coal were from the production of gas, mainly for domestic use, and from the manufacture of metallurgical coke in coke ovens. Ammoniacal liquor contained a large number of substances, of which the most important were ammonia, sulphide, thiosulphate, thiocyanate, phenol, and higher tar acids. The composition of a typical sample (examined during the work of the Liquor Effluents Committee) is given in the table below.

Composition of ammoniacal liquor and of spent liquor from the manufacture of concentrated gas liquor; lime not added during distillation:—

Constituent	Ammoniacal liquor		Spent liquor	
	Concentration (gm. per 100 ml.)	Oxygen absorbed from KMnO_4 in 4 hrs. at 27°C . (p.p. 100,000)	Concentration (gm. per 100 ml.)	Oxygen absorbed from KMnO_4 in 4 hrs. at 27°C . (p.p. 100,000)
Ammonia: free	1.99	0	0.039	0
fixed	0.649	0	0.509	0
Sulphide (as H_2S)	0.221	298	0	0
Thiosulphate (as S)	0.137	117	0.120	103
Thiocyanate (as CNS)	0.243	201	0.154	127
Phenols (as $\text{C}_6\text{H}_5\text{OH}$)	0.846	616	0.266	474
Other constituents (by difference)	—	556	—	478
Total	—	1788	—	1182

The value of the oxygen absorbed from permanganate by such a liquor was very high, and was due largely to the phenols and higher tar acids which it contained. Formerly many gas works distilled ammoniacal liquor and manufactured ammonium sulphate. In recent years, however, it had become more usual to distill the liquor and to condense the distillate to form concentrated gas liquor, which was sent to central works for working up into ammonium sulphate.

Waste waters from the metal industries, some of which contained very toxic constituents, had been responsible for much difficulty and damage at sewage-disposal works and for sudden and widespread destruction of fish in some rivers. During the past few years a great deal of research on the properties of these liquors and on methods of treatment had been carried out, particularly in Great Britain and America, and very fair progress had been made.

One large class of waste waters arose from the pickling—that was the treatment with acids—of metals, particularly copper and steel, to remove oxide scale. In pickling, the metal was immersed in a relatively strong solution of an acid and was then washed with water. There were thus two main sources of waste water—the spent pickle liquor, containing some free acid and a comparatively high concentration of the metal salt, and the waste washing water which contained the same constituents but in much lower concentrations. Copper was usually pickled in sulphuric acid and the chief soluble constituents of the waste waters were sulphuric acid and copper sulphate.

Waste Washing Waters

The concentrations of copper and acid in the waste washing waters were usually much too low to permit these substances to be recovered economically. Waste washing waters could be treated by direct addition of an alkali, such as lime or soda ash, to precipitate copper, or they could be passed through a bed of scrap iron to recover the copper as a metallic sludge. After treatment with iron the waste waters were still acidic and they contained salts of iron in solution.

A much more difficult problem arose in the disposal of the very large volumes of spent liquor and of waste washing waters from the pickling of steel. A large proportion of the steel treated in this country was pickled in a solution of sulphuric acid and the waste liquors contained sulphuric acid and ferrous sulphate. Discharged to rivers they absorbed dissolved oxygen and deposited brown iron oxide.

It seemed to be now generally agreed

that the most promising method of attacking the problem was to recover crystalline ferrous sulphate from the pickle liquor, preferably by a continuous process; this reduced losses of sulphuric acid and enabled the process of pickling to be carried on under constant favourable conditions. Usually the ferrous sulphate was recovered from the liquor by cooling it. It was reported that at the end of the war there were about 100 recovery plants of this kind operating in Germany; in most plants the liquor was cooled by blowing air through it in a drum.

Marketing Copperas

One of the main difficulties in operating the process was to find a market for the copperas recovered. Although a certain quantity could be disposed of for such purposes as manufacture of pigments and polishing powders and for use as coagulant, it was generally agreed that if the process were widely adopted the only promising method of disposal would be by roasting to produce iron oxide (which could be used in blast furnaces) and sulphur trioxide and dioxide for the manufacture of sulphuric acid.

Waste waters from factories engaged in electroplating differed very much in composition according to the plating processes used; in considering methods of treatment, however, they might be broadly divided into two groups, according to whether they did or did not contain chromates and cyanides. If neither of those substances was present it was usually sufficient to neutralise the acidic liquids in order to precipitate the toxic metals which they normally contained.

The effect of chromates on the treatment of sewage by biological filtration and by the activated-sludge process was well known.

The chief sources of chromate likely to be encountered were waste waters from chromium plating, from anodising aluminium, and from the cleaning of metals.

The most important methods of treating washing waters containing chromate were by precipitation of an insoluble chromate or by chemical reduction of chromate and precipitation of chromium hydroxide. Special methods of treatment were also necessary for waste waters which contained cyanide, as did many waste liquids from electroplating industries.

At many electroplating works there were different types of waste water, some of which did and some did not contain cyanide. Whenever possible it was advisable to treat the waste waters containing cyanide separately. The only two convenient methods of removing cyanides so far developed were treatment with ferrous sulphate and treatment with chlorine.

MINIMISING LABORATORY RISKS

A Symposium on Practical Safeguards

SOME practical contributions, in a specialised field, to the recent information on safety measures in chemical work were made at the conference held in London by the Institute of Physics in collaboration with the Institution of Metallurgists. This put into effect a proposal originating with the Royal Institute of Chemistry. In the two sessions, of which the chairmen were Dr. G. Roche Lynch, president of the Royal Institute of Chemistry (morning) and Dr. H. Lowery, vice-president of the Institute of Physics (afternoon), short papers were presented by seven principal speakers and nearly 20 extempore contributions were heard. The proceedings, which are summarised here, will later be published elsewhere in full.

The Human Element

Mr. Idris Jones, of the Chemical Research Laboratory (DSIR) submitted the opening paper, "The Organisation of Safety Precautions in Chemical Laboratories." The fundamental factor, he stressed, was the human one. In an analysis of accidents only 16 per cent had been attributable to apparatus, as distinct from human failings. Instruction in safety methods should, he considered, be part of chemical education. Workers should be taught to avoid having benches too crowded and to practise "good housekeeping." When a process was being developed, the least dangerous solvents should be chosen whenever alternatives were available.

At the CRL a safety organisation had been set up and a senior member of the staff had been appointed part-time safety officer. He had attended a course organised by the Royal Society for the Prevention of Accidents and the Ministry of Labour. Section safety officers had also been appointed and together they constituted a safety committee.

Among the spheres where their attention was most needed were the high pressure laboratory, the workshops, in the handling of radioactive chemicals and in any department in which special fire risks existed. They also inspected and maintained safety apparatus. A code of conduct was very desirable and the Association of British Chemical Manufacturers' code, although designed for industry, was a useful guide in laboratories.

The CRL Safety Officer had drawn up a pamphlet on laboratory safety measures, originally for internal use, which had been reviewed by the Chief Inspector of Factories and had now been published. Co-operation at all stages had been the keynote and the assistance of the local factory inspector and the fire service officer had been sought.

Impressive evidence of the good order which can be maintained in laboratories was conveyed by the slides with which Dr. L. J. Burridge, Imperial Chemical Industries, Ltd., illustrated his paper "Safety and Good Housekeeping in Chemical Laboratories." He assured the audience that the tidy, glistening benches and shining glassware were the normal condition of his laboratories; there had been no special clean-up.

Basically, the security obtained in these laboratories was founded on teamwork and taking a personal interest in each assistant. Everyone in the laboratory took part in cleaning and dusting. No bits of broken glass or floor obstructions were permitted. Apparatus was returned to its place immediately after use—and had a place. Cupboards and drawers were kept tidy, rubber gloves were kept on racks, metal parts aluminium painted; transparent sided cases shielded rough balances, pH meters and even vacuum pumps. Buchner flasks and vacuum desiccators had solid metal guards, distillation units had expanded metal guards.

Safety and Hygiene

For cold traps, liquid nitrogen was used rather than air. Cylinders were always used in the vertical position, in stands and securely chained. Electrical connections were kept short and any excess wire coiled neatly out of the way—particularly out of the way of possible water leaks.

Pipettes were never placed directly in the mouth but always used with an interposed bulb. Both this measure and the personal allocation of dust respirators (names being stencilled on the containers) made for general hygiene as well as immediate safety.

The widening use of electrical equipment in chemical practice conferred a special interest on Mr. J. C. Cornwell's paper on "Prevention of Accidents Arising from Electrical Work." Dealing with human reaction to electric shock, he recalled that a report issued by the University of California had represented the following to be "average critical currents":—

Threshold of perception 1 ma. a.c.—5 ma. d.c.

Threshold of muscular decontrol 15 ma. a.c.—70 ma. d.c.

Up to 70 ma. d.c. could be tolerated without producing muscular contractions but there was a sensation of internal heating. Above this figure there was intolerable shock at the moment of interruption of

supply. The more violent effects had been tabulated:—

Threshold of danger to life 20 ma. a.c.—80 ma. d.c.

Threshold of fibrillation 100 ma. d.c.

Fibrillation, always fatal, was a disruption of the normal heart action, an unco-ordinated asynchronous contraction of the ventricular muscle fibres.

Body resistance might be 400 to 600 ohms; it was always below 1000. Relatively low voltages could, of course, be dangerous and a case was recorded of death due to shock from a 60 v. supply.

Much of this speaker's material on high tension work was very detailed and of a kind which chemists using oscilloscopes would do well to study.

Leadership

Certain guiding principles were advisable in organising work in laboratories handling explosives suggested Mr. O. C. Ellington, of the Ministry of Supply. He cited as basic precautions in testing (a) use of minimum amounts; (b) samples should be transported as little as possible; (c) handling of samples should be minimised; (d) special design of the laboratory and special training of staff were required; (e) special care was needed in selecting the nature of the test.

As an example of (e), he observed that in determination of moisture, heating should be avoided. If desiccation was needed it could often be carried out at atmospheric pressure rather than under vacuum and safer desiccants than sulphuric acid were to be preferred. In such a laboratory the supervising chemist should be a good leader and team-worker, rather than a man of scientific brilliance.

Radioactive Material

The laboratory itself should be in a one-storey building, spaciouly laid out, allowing 8-10 ft. per operator. Electrical fittings should be flame-proofed and gas in iron pipes or armoured pipe. Sinks should be numerous and the floors unpolished. Steam heating was preferable to electrical and, where a continuous water flow was needed, its outflow should be visible.

A high level of personal hygiene was required for safety from explosive and health risks from the various nitro-bodies.

Similar emphasis of an even more stringent kind was given by Mr. W. G. Marley, of the Atomic Energy Research Establishment. Deposition of radioactive material in the human body, he said, might occur by ingestion—affecting the alimentary tract or associated organs—inhalation, or skin absorption. Inhalation as spray or dust, which would attack the lungs, was the most serious problem.

To avert the risk of dangerous exposure of the body to external radiation the intensity of radiation had to be measured. For continuous exposure, the safe maximum dose was taken as 0.5 Röntgen per week in respect of X or Y rays; for β radiations the same in Röntgen Equivalent Physical. A film badge of X-ray film should be worn on exterior of clothing. The National Physical Laboratory now ran a "film badge service" for the assessment of such indicators. Over shorter periods, a docket ionisation chamber was desirable.

Periodical surveys of the laboratory for local contamination should give Geiger counter records of less than 500 per minute. Removable bench tops, stainless steel working trays, protective clothing, rubber gloves, overshoes and a hat had all been found necessary in this field.

A survey of the methods used in treating heat burns formed a major part of the paper of Dr. H. Davies, of the Ministry of Health. There was, he said, no universal treatment and the frequent changes in recommended methods had been due to the failures of attempts to provide one. The area of burn was more significant than the degree. For smaller burns, tulle dressings were good; for large-scale and severe burns the intravenous injection first of plasma, then of glucose-saline and the giving of sweetened drinks represented the best treatment.

MOLYBDENUM BLUE

WIDENED use of molybdenum blue, well known and valuable as a colorimetric reagent, is proposed by E. Jaffe (*Ann. Chim. Appl. (Rome)*, 1948, 38 (8), 456-0). He describes its use for detection of phosphoric acid and for distinguishing certain sugars—laevulose, invert sugar, and saccharose—from others. The blue readily forms in the presence of phosphoric and arsenic acids; with other acids it is less intense and slower or replaced by other colours. This was shown in tests with 1 c.c. of 1 per cent ammonium molybdate solution, 2 c.c. of the acid under test, and, after stirring, 2 c.c. ferric sulphate. The blue colour appears when phosphoric acid is present to the extent of 0.00002 g. and in the example cited it quickly formed and deepened.

By similar means, laevulose, invert sugar, and saccharose may be differentiated from other sugars; 5 c.c. of 1 per cent sugar solution, 1 c.c. phosphoric acid (density 1.7) and 2 c.c. of 5 per cent ammonium molybdate solutions are placed in a test tube suspended in a flask of boiling water. The three sugars gradually show the blue colour; the others remain colourless.

Catalytic Gas Reactions

Swedish Workers Claim Improved Methods

IMPROVED methods and apparatus for catalytic gas reactions are the subject of a patent for which an application has been filed in the U.K. by C. W. Pilo and S. W. Dahlbeck, of Djureholm, Sweden (9699/1948, conv. date 21.4.47).

In contact furnaces for oxidation of chemical compounds or mixtures in gaseous form the reaction is often accelerated by oxygen carriers—air or CO_2 . But, owing to the exothermic nature of such reactions, reaction zones of comparatively narrow limits are difficult to establish.

Various attempts have been made to overcome this, such as the use in earlier processes of pumice stone or other porous refractory material soaked with the salt of a metal of the 5th or 6th groups (V, Cr, Mo). Heating would transform the latter into the corresponding oxide which would then act as carrier.

Since a more or less heat-insulating material was used as catalyst the heat of reaction was not dissipated, and caused local super-heating. Marked improvement, however, was obtained by using a heat-conductive catalyst, such as aluminium flake, in contact with the walls of reaction chamber.

The object of the present invention is to increase the amount of actual reacting substance and of yield, and generally to increase efficiency; more particularly to reduce the risk of partial destruction of the reaction product. Further objects, implied in the foregoing, are to cause reaction gases to pass through the chamber in a slow tur-

bulent current, giving more time for attack, and to keep the temperature substantially constant.

In the method proposed, the catalyst is applied to a carrier of comparatively thick wire gauze made in the form of one or more rolls without a free central channel, and with a mesh large enough to permit turbulent passage of gas. One or more of such gauze carriers are housed in reaction chambers, tubes, or passages.

The heat generated may be carried off by means of positively circulated molten metal or alloy. During interruptions this metal may remain and set, but can be melted, e.g., by introducing hot flue gases. In this way, temperature can be kept constant.

With catalyst carriers of this type the following advantages are claimed: (1) Effective removal of reaction heat; (2) pressure drop of the reaction gas is small, even in long tubes; (3) the motion of gas is turbulent, with maximum convection effects between gas, catalyst and the walls of catalyst tubes, and minimum requirements of catalyst material; (4) the temperature remains uniform.

By having metal gauze cylinders divided into suitable lengths some preheating may be done, and provision can be made for using different kinds or amounts of catalyst. Uncoated gauze cylinders may be inserted between those that are coated with catalyst in order to carry off or supply heat; and through suitable pipe cooling gas may be supplied instead of steam.

Liquid Fuel from Coal in South Africa

THE Minister of Economic Affairs has announced the conditions under which he proposes to issue a licence to the Anglo-Transvaal Consolidated Investment Co., acting as trustee for a company still to be formed, to manufacture liquid fuel from coal in South Africa. The licence will stipulate the establishment of a plant with a producing capacity of 76 million gal. of liquid fuel and oil per annum, with the proviso that the plant shall at all times be worked at maximum production capacity but that production shall not exceed 1000 million gal. of liquid fuel and oil in any one financial year, states a report in *The South African Mining and Engineering Journal*.

The authorised capital of the company will not exceed £13 million to be issued in 5s.

shares at par at appropriate times.

The proposed licence lays down that the liquid fuel shall be manufactured from the coal deposits in the Vredefort district of the Free State and as far as practicable the whole of the coal in each seam shall be used. It is specifically stipulated that no coal containing less than 30 per cent of ash shall be rejected or left in place except for appropriate support of the underground workings, unless it can be shown that the properties of the coal, other than its ash content, render it unsuitable for oil production.

A period of four years is set within which production is expected to begin.

The proposals are that at all times a majority of directors of the company shall be Union nationals.

DISTILLATION COLUMN EFFICIENCY

U.S. Survey of Some Basic Processes

THE absorption of sulphur dioxide in water, distillation column efficiency and catalytic cracking processes were among the technical subjects given prominence at last week's 41st annual meeting in New York of the American Institute of Chemical Engineers.

A contribution to the better understanding of the mechanics of absorption which provided more complete performance data than has been available on a system of commercial importance in the manufacture of liquid sulphur dioxide and the manufacture of sulphite pulp, was offered by R. P. Whitney, Jr., and J. E. Vivian, of the Massachusetts Institute of Technology.

The over-all coefficients for sulphur dioxide absorption, the speakers said, show all the characteristics of a system where both gas and liquid film resistances exert an appreciable effect. They increase markedly with increasing liquor rate, gas rate, and temperature. Using certain assumptions based upon previous absorption studies, the over-all coefficients have been broken down to yield values for the two film coefficients.

The liquid film coefficients of this study are significantly lower than those predicted for the system by the Sherwood-Holloway correlation. As with the chlorine-water system, the explanation for this difference appears to lie in the relative rates of diffusion and hydrolysis of the sulphur dioxide within the liquid film. Pseudo liquid film coefficients, calculated assuming no hydrolysis within the film, are in very close agreement with the predicted values.

Effect of Pressure

A paper presented by Lloyd Berg and D. O. Popovac, of the Montana State College, Bozeman, Montana, dealt with the effect of pressure upon distillation column efficiency.

The rectification column measured 1 in. in diameter by 2 ft. long over-all and was filled with $\frac{1}{8}$ in. stainless steel Fenske helices. The test mixture consisted of *n*-octane-toluene and vapour-liquid equilibrium data was determined for this system at pressures between 20 and 760 mm. Hg. absolute.

The column was operated just below the flooding point and the unit was tested at total reflux and reflux ratios of 30:1 and 20:1.

In all cases it was found that the theoretical plates in the column as determined by corresponding vapour-liquid McCabe-Thiele equilibrium diagrams numbered between 11

and 14. The same column calibrated 14 plates at 760 mm. Hg. absolute with a standard test mixture of *n*-heptane-toluene.

These results, the speaker said, indicate that the column efficiency was independent of pressure and that it may be possible to base vapour-liquid equilibrium data determined at the same pressure as that at which the column is to operate, since the HETP of a given packing remains constant.

Catalytic Cracking Processes

Discussing the "Economics of Moving Bed Catalytic Cracking Processes," T. A. Burtis, J. C. Dart, C. G. Kirkbride and C. C. Peavy, of the Hendry Process Corporation, Marcus Hook, Pennsylvania, recalled that in recent years great quantities of high quality, high octane gasoline had been made available at low cost almost entirely through the efforts of chemical engineers and their development of processes for catalytically cracking petroleum.

Prominent among the catalytic cracking developments have been the "Thermoform" process and the "fluid catalyst" process, it was pointed out. Now a new process, the "Houdriform moving bed" process, a modification of the Thermoform catalytic process (TCC), has been put into production.

Catalyst transportation in the TCC process is accomplished by mechanical elevators which move catalyst from the bottom of the reactor to the top of the regenerator and from the bottom of the regenerator to the top of the reactor, thus completing the catalyst cycle. In order to obtain high catalyst-oil ratios, a very desirable condition, mechanical transportation must be provided by large and expensive elevators.

With a low catalyst-oil ratio the carbon-catalyst ratio increases and the amount of carbon to be burnt off in the regenerator is consequently higher. This high carbon-catalyst ratio requires either low burn-off rates or large catalyst coolings are built into the regenerator to prevent overheating of the catalyst and its permanent deactivation.

The Houdriform design allows high catalyst-oil ratio by the use of a gas lift transportation system. The reactor has been placed on top of the regenerator, allowing gravity feed from the reactor to the regenerator. Lower attrition rates on the catalyst are achieved with the gas lift over the mechanical system. The lowered carbon-catalyst ratios allow the elimination of cooling areas in the regenerator.

INDUSTRIAL SYNTHESIS OF UREA

Scientific Basis of Successful French Method

IN a paper read at the 20th Industrial Chemistry Congress, in Paris, M. Fréjaques, Director of Research of the Cie. de Prod. Chim. et Electromet. d'Alais, Froges et Camargue, described this company's process for production of urea, based mainly on French patents 826,280 and 928,247 (*Chim. et Ind.*, 1948, 60, 22-35). The author discussed fairly fully the underlying theory in connection with the relevant literature listed in the bibliography, beginning with Bassarow's original reaction, about 1870, namely, dehydration of ammonium carbamate by simple heating under pressure.

High Pressure

Discussion of the theory of carbamate of ammonia formation begins with the metastable water/carbamate and the carbamate (urea, water) systems, as established and graphed by Janěcke, and includes curves and equations relating to dissociation tensions, heats and rates of reaction, dehydration of ammonium carbamate, effect of excess water and ammonia, pressure, solubility equilibria, and decomposition of urea. One important practical conclusion from this discussion is that the highest possible temperatures and pressures should be used. The reaction, in fact, becomes almost instantaneous under pressures of about 100 atmospheres and at temperatures in the neighbourhood of 150°C.

Since the reaction is never total and only about 50 per cent of the ammonia is converted in one operation, it is necessary to recover residual ammonia and carbon dioxide, for which there are at least two possibilities:—

Treating Residuals

1. *Using residual gases in subsidiary process.* This is simple. The two gases, NH_3 and CO_2 , under pressure in an autoclave, immediately combine to form the carbamate, which is at once dehydrated. The residual gases are separated from the urea and transferred to the subsidiary plant. Theoretically it would be best to use the gases in stoichiometric ratio, but this is rather difficult in practice, and some excess of NH_3 is preferable. The heat of the reaction is more than sufficient to keep the autoclave at the required temperature between 150 and 200°C. To reduce exothermic heat the NH_3 may be used in liquid state, and the CO_2 either gaseous or liquid.

Time required under optimum tempera-

ture and pressure conditions is 15-20 minutes and catalysts are not needed. Some further details are added. The principal difficulty is that of plant corrosion, which has been fully treated in the literature. In Italy, where a plant of this type has been installed by Fauser, the residual gases are used for the manufacture of ammonium carbonate.

2. *Recycling residual gases.* This is somewhat more complicated. Although it is fairly easy to obtain from the fractionating column gases dry enough to re-use without lowering the rate of conversion, re-compression of the mixture of the two gases is not very practicable, and it is not convenient to re-introduce them into the autoclave under pressure. Various methods have been tried and reported for dealing with the gases separately, but without marked success. On the other hand, direct re-compression of the mixture as practised in Germany by the I.G.F. (U.S. Pat. 1,429,483) appears to have been successful and used on a large scale. A still better method is that of Du Pont de Nemours as described in their U.S. Pat. 1,898,093.

Oil Suspension

In the A.F.C. process, described in part at least in the two French patents mentioned above, the unchanged carbamate is returned to the autoclave in the form of a colloidal solution or suspension in a neutral medium, instead of in gaseous or liquid form. A suitable medium has been found in mineral oils, if CO_2 and NH_3 are fed in with paraffin oil, suspensions containing at least 50 per cent, or possibly more, of carbamate are readily obtained, and remain sufficiently fluid to be pumped without difficulty. The flow sheet (page 693) shows plant layout of the process as worked by the A.F.C. in their Saint-Auban works (French pat. No. 826,280).

In the presence of mineral oil the carbamate does not form hard adherent crust or skin, and elimination of the heat of reaction is not difficult at relatively low temperatures and without much risk of corrosion. Various oils may be used for the suspension, and compression of such colloidal mixture is easily effected in apparatus similar to that used in the manufacture of synthetic liquid fuel. In the hot autoclave the carbamate melts or dissolves in the reaction mixture and the oil decants very quickly. If the reactants enter at the bottom the oil immediately rises to the top, where it continually escapes; and the apparatus remains constantly full of carbamate. The use, there-

fore, of even dilute oil suspension does not increase the size of the autoclave required for a given output.

If the thermal constants for the carbamate previously given in the theoretical discussion be accepted, then the thermal balance thus calculated is zero or slightly positive, working with a urea conversion rate of 40 per cent, the NH_3 being introduced above its critical temperature and the suspension containing 50 per cent of carbamate. The heat evolved by combination of fresh gas supplies is not lost. After expansion, a part of the residual carbamate dissociates and cools the oily mixture, and the calories supplied by the hot oil are then recovered. The oil thus acts both as carrier for the carbamate and for the calories.

In plants of large capacity this method of eliminating calories is sufficiently advantageous for injection of oil into the autoclave in an auxiliary process, so that recycling is not required. (See French pat. No. 928,247)..

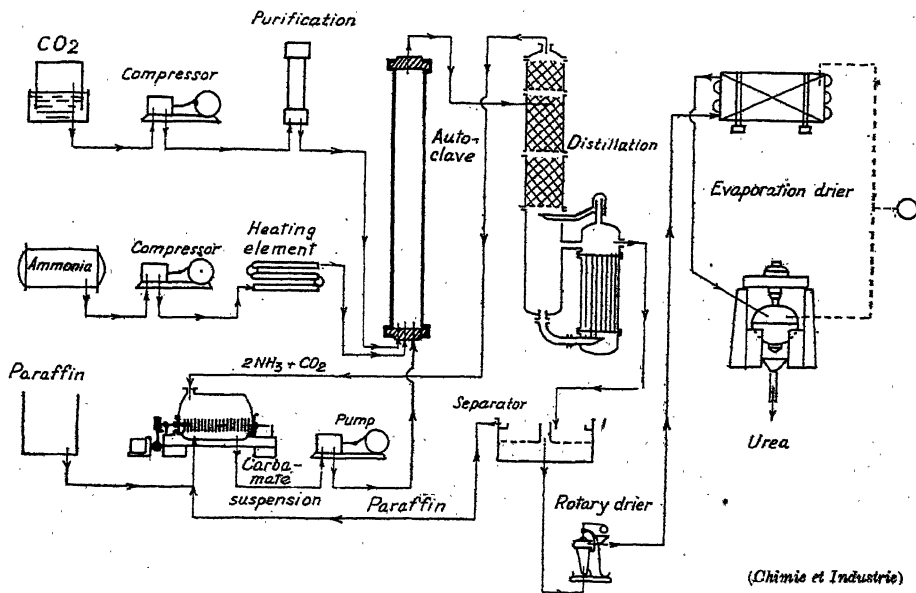
It is no doubt possible to introduce into the autoclave with the oil not only residual but also fresh supplies of gas, but this reduces some of the advantages mentioned above. Removal of inerts, or waste or excess products, can be done normally at the outlet of apparatus used for preparing the oily suspension. The considerations previously mentioned (in the original) indicate that, in working with slight excess of CO_2 and finishing condensation at ordinary temperature, any loss or removal of NH_3 with

the inerts, etc. (purges) is very small. The presence of impurities, for example, in the carbon dioxide used, does not greatly affect the process.

Much more could be said on the subject of distillation, purification, and crystallisation of urea solutions, especially on factors affecting crystal form. These and other questions may be dealt with later. But here it may at least be mentioned that by the addition of 5 per cent cyanuric acid to aqueous urea solutions, or of zinc cyanate to ammoniacal solutions, it is possible, on cooling such warm saturated solutions, to obtain crystals in the form of truncated pyramids (trémies) instead of the usual fine dendritic (needle) type. The faces only of the crystals are changed. The crystalline system, as determined by X-rays, remains the same.

It would also be of interest to review the various uses of urea, of which a very complete account has been given by Berliner in *Ind. Eng. Chem.*, 1936, 28, 517.

Tennant Group Widens its Field.—A majority interest in the old established business of Burgoyne Burbidges & Co., Ltd., manufacturing chemists and wholesale druggists, East Ham, London, has been acquired by one of the Tennant group of companies and Dr. W. Bryce Alexander has been elected to the board. The management will continue under the administration of Mr. Harold Housley, managing director.



(Chimie et Industrie)

Chemical History Was Made in Widnes

Rise and Growth of the Industry Described

THE history of the chemical industry of Widnes, Lancashire, and of many of the firms composing it, formed the subject of a lecture, "The Rise and Growth of Industry in Widnes," given recently to members of the Widnes Society of Arts by Mr. P. B. Lloyd, manager of the Widnes Employment Exchange.

The Alkali Industry

Mr. Lloyd said the alkali industry of Widnes—one of the town's main manufacturing trades, or perhaps its principal industry—had been referred to by Disraeli as "the foundation of a thousand industries." What he believed was its first chemical works was erected in Widnes in 1847 by John McClelland at Lugsdale for the manufacture of borax; the concern was styled the North British chemical Company. McClelland was shortly followed by John Hutchinson, 1849; James Muspratt, 1850; William Gossage, 1850; Henry Deacon, 1853; and these, said Mr. Lloyd, could be regarded as the founders of the alkali industry of Widnes.

The speaker went on to give brief pictures of the men and families behind the chemical industries of Widnes and of the inventions of LeBlanc, who, he believed, founded the knowledge of alkali as they knew it in modern times.

Dealing with the utilisation of waste products and the escape of noxious gases into the air, Mr. Lloyd said William Gossage was the first to tackle the problem of hydrochloric acid gas, and in 1836 invented what became known as the Gossage condensing tower, which anticipated the introduction of the Alkali Act of 1863.

Rationalisation

Gradually many chemical works grew up in Widnes. Fierce competition and high American tariffs compelled the alkali industry to rationalise itself and the United Alkali Company was formed in 1890. This later became part of Imperial Chemical Industries.

The artificial fertiliser and superphosphate industry, continued Mr. Lloyd, was initiated in 1840, when Liebig advanced his theory of soil fertility. Widnes was early in the field and in 1846 John Knight opened a works on the site occupied by Pilkington works. The probable reason for setting up the artificial fertiliser industry in Widnes was the large local production of sulphuric

acid and the nearness of the town to the western seaboard.

Copper sulphate was first produced in Widnes by John Hawke Dennis at works in Lugsdale in 1883. A peacetime production of over 60,000 tons annually placed Widnes in the position of a world centre of this product. Yet another important branch of the chemical industry was sited in Widnes—Orr's Zinc White, Ltd., known locally as the "Vine" Works. This branch of the chemical industry was established in Widnes on July 21, 1898, by John B. Orr, the founder and late chairman, who was believed to be pioneer of the industry, and who took out patents for lithopone in 1874.

The development of the manufacture of sulphate of alumina and the alums was due to the pioneering experiments of Peter Spence in 1845, Mr. Lloyd said. Phosphorus was first produced on a commercial scale by Albright in 1844, but the firm of Albright and Wilson (established in 1857) opened the Widnes factory in 1933.

Fine Chemicals

Widnes was also the home of some fine and medicinal chemicals. W. J. Bush & Co., Ltd., and Ward Blenkinsop & Co., Ltd., were comparative newcomers to the town, but J. W. Towers & Co., Ltd., were established in 1882.

The soap industry in Widnes was started by William Gossage in 1855, although he went to the town in 1850 as an alkali manufacturer.

Gelatine and glue manufactures were first started in Widnes in 1884 by the Farnworth Pith & Size Co., Ltd., but this business ceased to function in 1920, continued the speaker. Now the industry was represented by William Oldroyd & Sons, Ltd., who erected a modern factory at Ditton Brook in 1924.

Copper smelting began in 1850, but by 1870 had almost ceased. It was revived again in 1881 when Thomas Bolton & Sons, Ltd., erected works in Hutchinson Street, concluded Mr. Lloyd.

The speaker also reviewed some more recent developments which had contributed to the importance of Widnes in chemical and metallurgical industries, such as the asbestos cement industry established in 1916 by the British Everite Company and the non-ferrous metal production started by High Speed Steel Alloys, Ltd., in 1914.

Quick Detection of Dangerous Vapours

Widened Use of U.S. Electronic Device

IMPORTANT advances have been made in methods and equipment for safeguarding health against concentration in air of mercury vapour and other injurious matter. One of the more successful instruments the (G.E.C.) instantaneous electronic mercury vapour detector, is now being used by 16 State governments in the U.S.A.

Although the detector was primarily designed to indicate mercury-vapour concentrations, it will also give warning of ozone, illuminating gas, benzene, pyridine, diethyl-acetal, toluene, and many other materials.

Dr. Samuel Moskowitz, one of the senior chemists of the Industrial Hygiene Division of New York State, says that such equipment is being used for the continual surveillance of manufacturing plants, and by eliminating the laboratory work necessary in the older methods of mercury vapour detection, the instantaneous detector enables many "danger spots" to be inspected in one day.

The toxic limit of mercury vapour for continual breathing, established by the American Standards Association, is 0.1 milligram of mercury vapour per cubic metre of air, or approximately 0.122 parts per million by volume.

The instantaneous detector operates on the principle that ultraviolet light is scattered when it passes through atmosphere containing mercury vapour. A small blower draws air from the atmosphere into the

instrument at a rate of $\frac{1}{4}$ cu. ft. per minute, and passes it between an ultraviolet light and a phototube. Variations in the output of the phototube cause the electronic circuit to indicate the concentration of mercury vapour.

The detector will measure concentrations ranging from 0.03 to 3.0 milligrams per cubic metre, or from 0.004 to 0.37 parts per million by volume, with an accuracy of approximately 5 per cent. Weighing only 29 lb. it is fully portable and can be carried on an adjustable shoulder strap. It operates on a 45-watt, single-phase, 60-cycle, 110- to 120-volt circuit.

WORLD RUBBER PROSPECTS

PRODUCTION of natural rubber this year is estimated at 1.5 million tons, an increase of 230,000 tons over last year.

A new record output of 700,000 tons is expected from Malaya, while production in Indonesia is making a steady recovery from the low levels of recent years and the figure for 1948 is expected to reach 425,000 tons.

The preliminary outlook for next year indicates that Malayan output should be maintained, while that of Indonesia is likely to go still higher.

Consumption will be about 1.9 million tons of which 1.4 million tons will be natural and the remainder synthetic. Indications show a nominal surplus of between 100-150,000 tons of natural rubber.

⊕

The simplicity in use of the electronic detector is indicated in this picture, showing that although the mechanism is elaborate the operation is more or less a push-button process

⊕



German Chemical Prospects

Disruptive Effect of War Economy

DR. EMIL OTT, director of research of the (U.S.) Hercules Powder Company, who has recently returned from a three months' trip to Germany, England, Switzerland, the Netherlands and other European countries, declared that Germany can never hope to regain the dominant position it once held as a chemical producer in world markets. He made this claim at a meeting of the Synthetic Organic Chemical Manufacturers' Association held in New York last week. The lack of a number of raw materials such as petroleum and oilseeds, Dr. Ott said, would prove a limiting factor, but Germany would again become a significant factor in the chemical field. In the western zone of Germany, the speaker said, production of chemicals, petroleum and rubber is about 40 per cent of pre-war.

"Hopelessly Uneconomical"

Discussing the part played by the German chemical industry in the Nazi war effort, Dr. W. S. Callcott, of E. I. du Pont de Nemours & Co., Inc., said that some of the chemicals developed and produced by Germany to build and supply its war requirements were hopelessly uneconomical. German scientists, he pointed out, under I.G. Farbenindustrie and government leadership were forced to depend solely on domestic raw materials to evolve and produce chemicals for war. These expensive and circuitous processes, executed regardless of cost, lacked the directness and efficiency of American chemical processes and called for much greater manpower than would be considered economical in the U.S.A. The tremendous cost of research to develop these processes would not be justified in peace-time.

In an effort to develop new chemicals and make Germany independent in chemical supplies, dye research was greatly reduced, Dr. Callcott said. At the same time, the ingenuity of chemists was deadened by the stifling of competition by the dominant Farben interests.

Austrian Control of Pharmaceuticals.—As in pre-war years, Austrian manufacturers and importers of pharmaceuticals have to submit specimens for examination by the Federal Institute for Chemical and Pharmaceutical Research. Products which are imported within the framework of international aid programmes do not come under this regulation. Exports of Austrian pharmaceuticals which formerly were sent chiefly to the Balkans and the Near East, are reported to be reviving gradually.

Some Revival

Chemical Developments in the Zones

REPARATIONS are stated to have caused the dismantling of about 40 per cent of German chemical plant in Saxe-Anhalt. Of the factories still working four-fifths are Soviet companies and only 7 per cent remain private property, but the region even now supplies two-thirds of the chemical production of the Russian zone. Present sulphuric acid output capacity in the zone is 120-150,000 tons a year, compared with 110,000 tons in 1947.

Less Absenteeism

In the Western zone, the monetary reform has cut down absenteeism, with a resulting increase in production. Ten industrial associations are to supervise chemical production controlling 152 companies employing 30,000 workers. A new soda carbonate factory at Stassfurt has been proposed.

Basic chemical products, stimulated by improved coal supplies, have increased in the North Rhine-Westphalia area, and it is hoped that sufficient pyrites will be imported to satisfy all requirements. Owing to insufficient production of soda carbonate, however, glass works are using sulphate instead.

In south-east Germany, the Farbwerke de Hoechst factory is to be extended in May next year, and the present production of 40,000 tons of nitrogen is expected to be raised to 60,000 tons.

Since July, buna production has been prohibited in the bi-zone and total tyre production at Hannover is confined to natural rubber.

War Confiscation Challenged

The Société Internationale pour Participations Industrielles et Commerciales, Basle, has petitioned the Washington Federal Court regarding the freeing of shares valued at about \$100 million which, the company claims, have been unlawfully confiscated during the war because they were stated to be controlled by I. G. Farbenindustrie. The company points out that it has been incorporated according to the laws of Switzerland and that it cannot therefore be regarded as an instrument of an enemy power. Mention has been made of the fact that among the confiscated shares was a substantial block of shares in the General Aniline and Film Corporation of New York, over \$1,850,000 in cash and deposits in six New York banks.

I.G.F. Plant in the U.S.A

Source of Oxygen for Synthetic Oil

ORIGINALLY used by the I.G. Farbenindustrie in making acetic acid and other chemicals at Höchst, Germany, the first oxygen plant capable of tonnage production to be used for coal gasification purposes in the U.S.A. will be placed in operation within the next few weeks at the coal-to-oil demonstration plants of the U.S. Bureau of Mines at Louisiana, Missouri. It is a modern Linde-Fränkl unit which was dismantled and shipped recently.

The plant, to extract oxygen from the air, has a capacity of 23,000 cu. ft. or one ton per hour of 98 per cent oxygen. A 50,000 cu. ft. gasholder has also been erected.

The feasibility of using oxygen in the production of synthetic oil and gasoline from coal depends almost entirely upon the cost of oxygen. While the separation of oxygen from air is an old and well-known process, the amount of oxygen needed and the size of the units required for supplying synthetic liquid fuels plants are much greater than any previously contemplated.

In general, this unit is similar to other Linde-Fränkl plants built by the Linde Gesellschaft für Eismaschinen. It has, however, an auxiliary small column for the production of pure nitrogen which was required in chemical operations at Höchst.

Special Regenerators

The Linde-Fränkl plants differ basically from the conventional oxygen plants in their use of regenerative-type exchangers instead of continuous-flow recuperative-type heat exchangers. The Linde-Fränkl regenerators are packed with coils of corrugated aluminium strips, which perform the same function as the checker-bricks in a water-gas superheater, alternately absorbing and giving up heat.

Incoming air is chilled to more than 300 degrees below zero F. as it flows past the aluminium packing in one pair of regenerators. In another pair of regenerators, outgoing product oxygen and nitrogen cools the aluminium packing in preparation for the next incoming air cycle. Valves are reversed every three minutes. Frost and dry ice left on the cooling surfaces by condensation of moisture and carbon dioxide in the air is swept away by the oxygen and nitrogen streams.

Briefly, the coal gasification cycle in which the Linde-Fränkl unit will be used involves first crushing, pulverising, and drying the coal. The pulverised coal is

(Continued in next column)

New Phosphorus Facilities

Large Increase in Monsanto Production

ADDITIONAL furnace facilities for the production of elemental phosphorus, raising the company's capacity by 50 per cent, are now being completed at Monsanto, Tennessee, by the Monsanto Chemical Company, Dr. Charles A. Thomas, executive vice-president of the company, announced last week. Full production is expected by the end of the year.

The company is retaining the leadership which it earned in 1937, through its successful pioneer effort to produce yellow phosphorus on a large commercial scale in an electric arc furnace. With the addition of the new furnace the plant output will be increased nearly 50 per cent.

Phosphate-Bearing Earth

The operations at Monsanto consist of mining and processing the phosphate rock into yellow phosphorus. Phosphate-bearing earth is strip-mined near the plant, washed, sintered and processed electrically to produce yellow phosphorus which is 99.9 per cent pure.

The phosphorus is stored in underground tanks and transported in tank cars under a protective layer of water to the plants at Monsanto, Illinois, and Trenton, Michigan, where it is converted into phosphoric acid and phosphate compounds for use in heavy industry and in the manufacture of such products as baking powder, self-rising flour, dentifrices, medicinals, detergents, water softeners and other products in common use.

The expansion of the Tennessee plant is closely integrated with expansion programmes both at Trenton and St. Louis, where new facilities have been designed to utilise further the increased supply of phosphorus. At Trenton, in addition to the production of phosphoric acid and sodium phosphate, phosphorus is converted into many varied derivatives, such as the sodium, potassium and ammonium groups. At St. Louis and nearby Monsanto, Illinois, facilities are being added for increased production of phosphoric acid and for calcium phosphate.

Phosphorus chemistry promises to be one of the most important U.S. fields of research.

then fed to a reactor, together with oxygen and steam or carbon dioxide. Under high temperatures, the mixture reacts to form synthesis gas—the carbon monoxide and hydrogen required in the Fischer-Tropsch process and a source of hydrogen for the coal hydrogenation process of producing synthetic liquid fuels.

American Chemical Notebook

From Our New York Correspondent

NEARLY \$1.5 billion a year have been spent on the development of the chemical industry in America since the war, declared Dr. Robert S. Aries, of the Polytechnic Institute of Brooklyn. The doctor, addressing the 41st annual meeting of the American Institute of Chemical Engineers in New York, forecast a considerably lower expenditure next year, mainly because of the high costs of construction of chemical process plants, which had caused the cancellation of some plans for expansion. (Some of the technical contributions at that meeting are reported elsewhere in this issue.)

* * *

Three U.S. Patents, Nos. 2,452,529, 2,452,530 and 2,452,531, have just been issued to Philips Laboratories, Inc., Irvington-on-Hudson, New York, covering new magnetic ferrite materials whose unusual properties are said to permit a considerable reduction in the physical size of electrical components such as inductors and transformers. Developed in the laboratories of the Philips Company in the Netherlands, the new materials will be manufactured and marketed in the United States by the North American Philips Company, Inc. The magnetic ferrites, which consist essentially of homogeneous mixed crystals of metallic oxides and iron oxide, have high magnetic permeabilities and, in contrast with the usual magnetic materials they are essentially electrically insulating. They permit the production of high-frequency inductance coils, etc., having a very high quality coefficient in a small compass.

* * *

The Bureau of Agricultural and Industrial Chemistry in Washington has just announced that its patent, No. 2,438,300, covering a process for the purification of acetic acid by azeotropic distillation, is now available to be licensed on a royalty-free, non-exclusive basis. Acetic acid occurs as a by-product in the manufacture of butadiene from 2,3-butylene glycol diacetate and the patent relates to the method of separating such acid from the mixture obtained by continuously adding water and continuously distilling off the water-azeotropes of other constituents of the mixture. After this treatment, acetic acid may be separated by simple distillation.

* * *

Two hundred and fifty-five atomic energy reports are listed in a bibliography just

released by the Office of Technical Services, U.S. Department of Commerce. Supplementing a list of reports issued earlier this year (No. PB-87782), it greatly enlarges the scope of the matter now available from the Office of Technical Services. The two lists cover subject matter on atomic energy which has been freed from security restrictions by both American and British agencies and now being offered for the furtherance of basic research. Copies of the new 13 pp. list (No. PB-87782-S), "American and British Atomic Energy Reports: A Supplement" (50 cents), may be purchased from the OTS, U.S. Department of Commerce, Washington 25, D.C.

* * *

In an effort to reduce the number of accidents in the welding trade, the accident prevention department of the Association of Casualty and Surety Companies, 60 John Street, New York, N.Y., has just issued a pocket-size booklet on safety in welding and cutting operations, one of a series designed to help curtail accidents in the construction trades. The booklet describes safe methods of operation and safe handling of equipment in gas welding and cutting and in electric arc welding. Safety in spot welding, safe handling of acetylene generators and symbols for arc and gas welding are included. The last page of the booklet is devoted to "off-the-job" accident prevention.

* * *

A new plastic material has been combined with a cloth fabric to make what is claimed to be a much improved plastic cloth. Strong and durable, it is stated that it can be used to replace wood, steel and some alloys in the moulding of automobile bodies, boats, aeroplane fuselages, water pipes, etc. Scientists in the U.S.A. who created and tested the new material at the Industrial Research Institute of the University of Chattanooga, Tennessee, say it is twice as strong as structural steel, lb. for lb.

ECA Purchases.—Industrial items represented 60 per cent of the commodities approved for purchase under the European Recovery Programme in the week ended November 3. Items covered in the total of \$192,626,840 included chemicals, coal, petroleum, non-ferrous metals, machinery, primary iron and steel mill products and non-metallic minerals.

Home News Items

Furnace Explosion Deaths.—Two men were killed and 21 injured in an explosion on Tuesday at the top of a blast furnace at the works at Workington, Cumberland, of the United Iron and Steel Co.

Students' Visit.—Chemistry students from the Royal Holloway College, London University, last week visited the Glaxo Laboratories, Ltd., Greenford, Middlesex, and inspected the company's modern research laboratories.

Wholesale Prices.—The Board of Trade summary of changes in wholesale prices shows that the index number of chemicals and oils (1930 = 100) rose from 186.4 in October, 1947, to 192.8 last month.

Leather Research Exhibition.—The annual exhibition of the British Leather Manufacturers Research Association is to be held on November 25, 26 and 27 in the Assembly Hall of the Royal Empire Society, Northumberland Avenue, London, W.C.2.

Bicycle and Motor Cycle Show.—The first Bicycle and Motor Cycle Show to be held for ten years was opened in London on Thursday. Among the novelties are the new system of constructing bicycle frames by joining the tubes electrically without lugs, and the first three-speed fixed-hub gear.

Chemical Imports Raised.—Imports of chemicals into the U.K. during the first six months of 1948 were valued at £15,900,101, an increase of 36 per cent on the corresponding period for 1947. The U.S.A. was the most important supplier, with exports of £4,891,496. Germany's contribution of £2,472,314 was greater than in 1938.

Factory Inspector Film.—A new COI film sponsored by the Foreign Office entitled "Man Alive" deals with 24 hours in the life of a factory inspector, and is intended to show overseas the work done in this country to protect the health and welfare of factory workers. "This is Britain No. 31," one of a series of cinemagazines is produced for the Board of Trade.

Better Coal Output.—The weekly production of deep-mined coal in Britain is rising, but at too slow a rate for the 1949 target of 200 million tons to be reached. Last week's output was the highest since December last year, and the total output (deep-mined and opencast) was the highest since March this year. Comparative production figures are: Last week, 4,301,900 tons (4,097,100 tons deep-mined, 204,800 tons opencast); previous week, 4,251,300 tons (4,050,000 tons deep-mined, 201,300 tons opencast).

New London H.Q.—The London office of Woods of Colchester, Ltd., will be removed on December 2 from 45 Kingsway, W.C.2, to "Fenwick House," 292 High Holborn, W.C.1.

Next BIF.—Particulars of allotment space at the 1949 BIF are being sent out this month to exhibitors, who number more than 2000. The displays of chemicals will again be grouped at Olympia during May 2-13.

Big Increase in Aluminium Imports.—Practically all U.K. imports of aluminium during the first half of 1948 were from Canada. There was a heavy increase in trade, from 343,944 cwt. in the first six months of 1947 to 1,413,764 cwt. this year.

Soil Research in Scotland.—Plans for a new building for the Macaulay Institute for Soil Research near Aberdeen have been approved by the council of management. It will be erected near the present institute building at Craigiebuckler. The new laboratories are nearing completion.

Pulp Factories for Scotland.—The development of pulp factories from a prosperous timber industry was forecast by Mr. John T. Smith, Glasgow timber merchant, in his address to the Royal Scottish Forestry Society in Perth. Paper manufacturers, he stated, were already receiving small amounts of home timber.

Leaking Hydrogen Fluoride.—Members of Bootle Fire Brigade wearing breathing apparatus had recently to deal with a leaking cylinder of hydrogen fluoride at North Hornby Dock. A rope was fastened round the cylinder, which was split at the base, and it was lowered into the dock and the spot marked. A fire official said that powdered chalk was an effective method of dealing with leaking cylinders of this nature, but none was available. The use of sand would have had dangerous results.

Perspex for Railway Stations.—A new type of platform lighting fixture, incorporating the name of the station, is being installed on a number of stations of the Eastern Region of British Railways. It is a pendant fitting, consisting of a 2 ft. inverted trough of curved Perspex panels in an aluminium casting. The panels are being specially made for British Railways by the Triplex Safety Glass Co. at their Willesden factory where the names of the stations are stencilled on the Perspex by a special process. They are installed already at Stratford, Maryland, Forest Gate and Manor Park.

Technical Publications

TO commemorate the completion of a century's continually increasing activities as producers and merchants of a wide range of chemical materials, James Miller Son & Co., Ltd., Glasgow and London, has produced a small volume, excellently produced and illustrated, which tells the story of the firm's growth since its foundation by James Miller as "Commission Merchants and General Yarn Agents." It reflects, among other things, how great was the stimulus afforded to enterprising and farseeing individuals in chemical industry by the early development of the coal carbonisation industries.

* * *

The post-war shortage of oil brings into prominence the need to expand the production in the Middle East. In "The Place Middle East Oil Will Occupy in World Markets" a paper presented at the annual meeting of the American Institute of Mining and Metallurgical Engineers now published as a booklet by the Anglo-American Oil Company, Mr. C. J. Bauer gives a comprehensive survey of the position. A great expansion of the industry is necessary and steel is one of the major items required to enable the programme to be carried out. The booklet is illustrated with a number of maps and diagrams permitting a ready comparison of facts and figures. It is anticipated that by 1951 100 per cent greater production from the Middle East will be required.

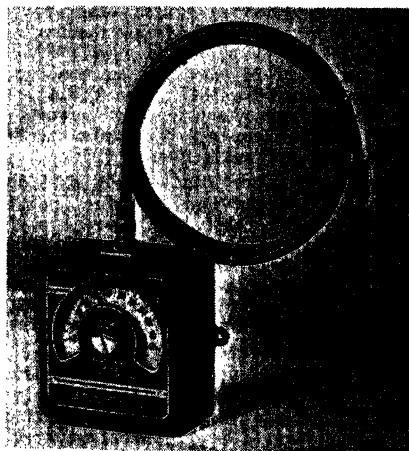
* * *

The torsion type of balance provides an accurate, rapid and extremely simple method of determining the weight of small objects, powders and liquids, whose mass is less than 10 grammes and not less than 1 milligram. It is equally useful for individual weighings in the research laboratory or for the routine checks so often necessary under industrial conditions. White Electrical Instrument Co., Ltd., London, claims to be a pioneer in the manufacture in Great Britain of this type of balance, and since 1915 the company has been supplying many thousands of these instruments to laboratories, hospitals, medical schools and the leading industrial concerns throughout the world. Models O and P are illustrated and described in an attractive leaflet just issued by the company. Model P, hitherto only available for export, can now be supplied to the home market.

Metallurgical tests used to obtain a fair recovery of manganese from low-grade Arizona oxide manganese ores and an excellent recovery of alumina from high-iron Arkansas bauxite are described in two separate publications R.I. 4291 and 4299 by the Bureau of Mines. In Laboratories at Salt Lake City 64.9 to 96.8 per cent manganese from low-grade ores were recovered from samples which were considered to be of a grade for industrial use. According to the second report, in laboratory and pilot plant the Bureau successfully obtained 94 per cent of the alumina from high-iron bauxite through a lime-soda sinter process, with very little loss of soda. The report is the fourth in a series of five describing the use of the lime-soda sinter process on low-grade ores.

* * *

The 1948/49 edition of the "FBI Register of Manufacturers" has been published jointly by Kelly's Directories, Ltd., and Iliffe & Sons, Ltd. It is a complete guide to members—nearly 6000—and their products and services and totals nearly 1000 pages. Home orders for the register should be sent to Kelly's Directories, Ltd., 196 Strand, London, W.C.2, and overseas orders to Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. It costs 42s.



Type OZ indicating controller, by the British Thermostat Co., Ltd., Sunbury, Middlesex, providing visual temperature control for heating and refrigeration. Combining the functions of thermometer and thermostat, it indicates and controls temperatures up to 620°F.

Overseas News Items

Polish Dyestuffs Requirements.—Poland's requirements of imported dyes are estimated at 700 tons for the second half of this year.

Reparations for France.—France is to benefit from allocations of a number of items of German industrial plant including a sulphuric acid factory with annual capacity of 36,000 tons.

Vermiculite Processing in Italy.—A Milan firm is reported to be planning to use South African vermiculite for the manufacture of various articles, chiefly insulating materials. The firm is said to be working on the basis of a U.S. licence.

Norwegian Building Construction.—The oil refinery at Valloe, South Norway, is to be rebuilt, and will have an estimated capacity of 30,000 long tons per annum of crude oil. A new plant for the production of caustic soda is under construction by Den Norske Cellulfabrikken A/S, at Sarpsborg. Capacity is estimated at 10,000 metric tons and output is expected to be used mainly for the production of rayon staple fibre.

Jute Substitute Found in India.—A report from Calcutta states that, according to the Research Institute of the Indian Jute Mills Association, the fibre of a shrub which sometimes grows to the height of eight feet, and is known as "Chukai" in Bengal, has been found to be a good substitute for jute. It is possible that areas unsuitable for growing jute might be utilised for growing this substitute.

Rumanian Oil Company Heavily Fined.—The Rumanian Astra-Romana Oil Company, a subsidiary of the Royal Dutch-Shell group, has been fined a sum equivalent to about £1,189,000 "for having robbed oil from the State-owned sub-soil," states *Rador*, the Rumanian news agency, in a message from Bucharest dated November 13, which says that the fine has been imposed on the company's "former leadership."

German Experts for Indian Government.—Two German experts—Drs. Grimme and Siegart—have recently arrived in India to advise the Government of the Indian Union as well as private industrialists on the setting up of new industries. Dr. Grimme said that he had been invited by the Government to help them in the manufacture of industrial products. Dr. Siegart, a metallurgist, who is likely to be posted to Calcutta, will examine the possibility of developing the aluminium industry. More German technicians are stated to have been invited by the Government of India.

Russian Soda Ash Plant.—According to the Soviet Press, a new soda ash plant is being constructed near Sterlitamak, using brine from an adjacent salt deposit for the process.

Sweden's Uranium from Oil Shale.—The Swedish Atomic Energy Commission is to attempt to extract uranium from oil shale on the site outside Stockholm where Alfred Nobel started his first dynamite factory in 1866.

Montecatini Factory Resumes Production.—The fertilisers factory of Montecatini group, situated at Marina di Montemarciano in the Marches, has been reopened. It was badly damaged during the war and has been equipped with new plants.

Silver Jubilee Celebrations.—The council of the Indian Chemical Society, which completed the 25th year of its existence on May 9, has decided that the celebration will take place during the science congress week at Allahabad in January, 1949, so that the largest number of Fellows from all over India may participate.

Penicillin to be Manufactured in India.—According to a recent statement of Major General Sahib Singh Sokhey, Director of the Haffkine Institute, Bombay, penicillin, sulphur and anti-malarial drugs are to be manufactured by the Institute on a large scale. The manufacture of penicillin alone, he considered, would result in a saving of two or three million dollars per annum.

Ethylene-Glycol Shortage

Canadian distributors of anti-freeze mixtures have denied reports that they had received orders from Ottawa defecting the ethylene-glycol type of anti-freeze into Government stock holdings and curtailing its distribution to the public. One major distributor states that there is unquestionably a shortage of ethylene-glycol anti-freeze this year, resulting from the inadequacy of the Government import quotas. Alcohol anti-freeze used to cost only 25 per cent of the price of ethylene-glycol, whereas it was now worth about 50 per cent as much.

Until recently, all the ethylene-glycol type of anti-freeze was imported into Canada, but this year one firm, the Dow Chemical Co., of Sarnia, has undertaken to manufacture it. The Canadian-made product, according to members of the trade, may this year be sufficient to fill 20 or 25 per cent of the total Canadian demand.

Next Week's Events

MONDAY, NOVEMBER 22

The Chemical Society, Leeds University, 6.30 p.m. Prof. C. E. H. Bawn: "The Mechanism of Autoxidation."

Institution of Rubber Industry, Manchester Engineers' Club, 6.15 p.m. Dr. W. McG. Morgan: "Accelerators for Stocks containing Reinforcing Furnace Blacks."

The Textile Institute, Yorkshire section, Technical College, Huddersfield, 7.15 p.m. B. H. Wilsdon: "Principles of Textile Research."

Institution of Works Managers, Glasgow, Institution of Engineers and Shipbuilders in Scotland, 7 p.m. E. Ryalls: "The Repair and Reclamation of Machine Parts."

TUESDAY, NOVEMBER 23

Sir Halley Stewart Trust, Memorial Hall, Farringdon Street, E.C.4, 6 p.m. Lord Russell: "The Atomic Age, IV.—Our Scale of Values in the Atomic Age."

Chadwick Public Lectures, Royal Sanitary Institute, 90 Buckingham Palace Road, London, S.W.1. Bosson Gift Lecture. Alistair MacDonald: "The Influence of Hygiene on the Shape of Buildings."

Society of Dyers and Colourists, Huddersfield, Field's Cafe, Westgate, 7.30 p.m. Dr. C. H. Giles: "Colour Photography."

WEDNESDAY, NOVEMBER 24

Society of Chemical Industry (Food Group) Microbiological panel, London. Dr. J. B. Firth: "Spontaneous Combustion in Hay, Cotton and other Vegetable Materials."

Manchester Literary and Philosophical Society (Chemical Section) Portico Library, Mosley Street, 5.30 p.m. Dr. Metcalfe Brown: "Chemistry and Public Health."

THURSDAY, NOVEMBER 25

British Leather Manufacturers' Research Association, Annual Exhibition, Assembly Hall, Royal Empire Society, Northumberland Avenue, London, W.C.2. (Until 27th.)

Royal Institute of Chemistry (London and South-eastern Counties Section) Medway Technical College, Gardner Street, Gillingham, 7.15 p.m. F. Wormwell: "The Corrosion of Metals."

The Chemical Society, London, Burlington House, W.1, 2.30 and 7 p.m. Discussion: Dr. R. P. Linstead: "The Theory and Practice of New Technique in Separation and Purification." NORTH WALES: Bangor, University College, 5.30 p.m. Prof. W. Wardlaw: "Problems in Inorganic Chemistry."

Institute of Welding, 11 Upper Belgrave Street, London, S.W.1, 6 p.m. Joint meeting with Institution of Structural Engineers. H. Gottfeldt, Dr. Ing: "Curved Bridges and why they should be welded."

Manchester Federation of Scientific Societies, Royal Institute of Chemistry, Fifth Dalton Lecture, C. J. T. Cronshaw: "Through Chemistry: Adornment."

Institute of Metals, Birmingham, James Watt Memorial Institute, Great Charles Street, 6.30 p.m. T. Land: "High Temperature Measurements."

FRIDAY, NOVEMBER 26

Electrodepositors' Technical Society (Sheffield and North-east centre). N. A. Tope: "Factors Affecting the Distribution of Electrodeposits."

Manchester Statistical Society (Industrial Group). Society of Architects, 16 St. Mary's Parsonage, 6.45 p.m. W. T. Hale: "Statistical Considerations in the Setting Up of a Control and Inspection Scheme in a Steel Rolling Mill." Institution of Electronics, Gas Showrooms, Town Hall, 7 p.m. P. A. Cummins: "Electronic Equipment for Radio Control."

Institution of Works Managers, Merseyside, Exchange Hotel, Liverpool, 12.30 p.m. President of the Board of Trade principal guest at luncheon.

Sir John Cass Technical Institute (Department of Chemistry) Jewry Street, Aldgate, E.C.3, 6 p.m. W. K. B. Marshall: "Aluminium and its Alloys."

Society of Chemical Industry (Fine Chemicals Group), London School of Hygiene and Tropical Medicine, 7 p.m. F. Bergel: "Some Aspects of the Relationship between Chemical Constitution and Physiological Activity."

Royal Institute of Chemistry, Birmingham University, Edmund Street, 6 p.m. Dr. L. H. Lampitt: P. F. Frankland Memorial Lecture.

SATURDAY, NOVEMBER 27

Textile Institute, Visit to Fibreglass, Ltd., St. Helen's.

METALLIC CONTAMINATION

THE Food Standards Committee, whose appointment was announced by the Minister of Food in January, 1948, has set up a sub-committee to inquire into the metallic contamination of foods. This sub-committee will consider, among other things, the possibility of prescribing limits of contamination and the technological problems which might arise from the prescription of such limits. Mr. G. G. Barnes is chairman of the sub-committee, on which the following are among those who have agreed to serve: Dr. G. Roche Lynch, senior official analyst to the Home Office; Dr. J. R. Nicholls, Government chemist.

PERSONAL

THE Mond Nickel Fellowships Committee has made the following three awards for 1948. MR. S. G. CAMPBELL (Plessey Co., Ltd.); to study the specialised metallurgical industries in the U.S.A. and Canada. MR. S. J. GARVIN (Murex, Ltd.); to study the application of sponsored research, and the administrative methods employed, in the powder metallurgical industries in the U.S.A. MR. A. I. NUSSBAUM (Thos. Firth & John Brown, Ltd.); to study the application of rolling mill research, mill plant development and the theory of rolling to the manufacture of rolled steel products. The committee will later invite applications for awards for 1949. It administers a fund of £50,000 set aside by the company in 1946.

MR. FRANCIS J. CURTIS, vice-president and secretary of the executive committee of the Monsanto Chemical Company, St. Louis, Mo., was elected president at the 41st annual meeting of the American Institute of Chemical Engineers. He is a past chairman of the American section of the Society of Chemical Industry and Engineering Chemistry, and was Jubilee lecturer for the Society of Chemical Industry 1946-47. DR. WARREN LEE MCCABE, director of research of the Flintkote Corporation and former head of the chemical engineering department at the Carnegie Institute of Technology, is the new vice-president.

PROF. E. L. HIRST has been awarded the Davy medal by the Royal Society for his work in the determination of the structure of sugars, starches, plant gums, and especially of vitamin C. Other awards were: PROF. A. V. HILL, Copley medal; PROF. F. E. SIMON, Rumford medal; PROF. R. A. FISHER, Darwin medal, and SIR ROBERT WATSON-WATT, Hughes medal. The King has approved the award by the Royal Society of the two Royal medals for the current year to: PROF. HAROLD JEFFREYS and PROF. JAMES GRAY in recognition of their contributions in geophysics and astronomy and in anatomy and biology.

MR. J. B. MASON, chief engineer in the Fuel Efficiency branch at the Ministry of Fuel and Power, is relinquishing his post to take up an appointment with Powell Duffryn Technical Services, Ltd. He will establish offices in Sheffield, and will be responsible for the expansion of the company's organisation in the Midlands and North of England to meet the increasing demands from industry for more efficient use of fuel, heat and power.

MR. ASHLEY S. WARD, for many years chairman of the Ketton Portland Cement Co., Ltd., has retired from the board and MR. FRANK R. STAGG, who has been appointed in his place now holds the position of chairman and joint managing director. Other changes of the board include the appointment of MR. RAWSON F. STAGG as joint managing director and MR. F. W. ROBINSON, who is closely associated with the foundry supplies department of the associated company, Thos. W. Ward, Ltd., as a director.

DR. KENNETH M. WATSON, professor of chemical engineering at the University of Wisconsin, and engineering consultant, has received this year's William H. Walker Award of the American Institute of Chemical Engineers. This is an annual presentation given for a contribution of outstanding importance to chemical engineering literature. Dr. Watson is the author, with O. A. Hougen, of the books "Industrial Chemical Calculations," and a three-volume work on Chemical Process Principles."

The following council and other officers of the British Colour Makers' Association were elected at the association's recent annual general meeting: Chairman, MR. V. WATSON; vice-chairman, MR. J. H. GRIMSHAW; honorary treasurer, MR. C. G. A. COWAN. Council: MESSRS. C. M. BEAVIS, F. BURRELL, H. GOSLING, J. H. GRIMSHAW, S. K. ROBERTS, V. WATSON, and C. E. YOUNG. Secretary, MR. ALLAN J. HOLDEN.

At the seventh annual general meeting of the Mechanical and Hydraulic Leathers Manufacturers' Association, MR. W. PRIMROSE, of Barrowfield Leather Co., Ltd., Bridgeton, Glasgow, was elected chairman for the ensuing year, and MR. A. C. DEW, of Barrow, Hepburn & Gale, Ltd., Mitcham, Surrey, was elected vice-chairman.

At the first annual general meeting of the Fertiliser Society, MR. DAVID BOYD was re-elected as president and MR. A. E. SELL as vice-president. MESSRS. H. B. DAVIES, D. P. HOPKINS and J. W. NAPIER were elected to the council in place of MESSRS. D. J. BIRD, J. R. G. FISON and A. T. VERNON who had retired by rotation.

DR. ALEXANDER FLECK, of Imperial Chemical Industries, Ltd., performed the opening ceremony of new science laboratories at Durham University. He deputised for LORD MCGOWAN who was ill.

Progressive Trends in Argentina's Research

Studies in Identification and Separation and Uranium in Petrol

ACTIVITY in a number of original directions in chemistry and metallurgy is reflected in contributions to recent issues of *An. Asoc. Quim. Arg.*, of *Indust. y Quim.* (the review of the Argentinian Chemical Association) and *Revista de Quim. Ind.*

R. Vanossi has proposed a simplified method of identifying osmium, ruthenium, and germanium, based on existing methods, and using 2-4 cg. of material or less down to a few mg. Modifications consist chiefly in (1) the use of a V-shaped distilling tube to facilitate the passage of vapours, having an absorption U-tube with branch containing fragments of glass rod, (2) the use of ethyl acetate or di-ethyl ether, in the final identification of Ru, with thio-urea, which may be done even in the presence of Se, thus avoiding removal of the latter and facilitating identification of Ru; (3) simplified use of Ge reaction with quinine tannate.

Radioactive Residues

E. Longobardi *et al.* continue earlier work on determining the presence of uranium in petroleum. Samples of oil were obtained from San Rafael in Mendoza province, and carefully ashed, yielding residue suitable for radio-active tests—to the extent of about 40 g. from 10 kilos of petroleum. Radio-activity was tested in a Boudouin electro-scope (La Plata University).

For a fall of four points on the scale (5.4 to 5) the time normally was 78 min. 15 sec.; with petroleum ash spread out in a copper tray the time was 72 min. Chemical tests were carried out by Scott's method, and spectral analysis by that of Mannkopf and Peters. The origin of uranium in petroleum is discussed.

Uranium is normally tetravalent, but there are compounds which indicate other valencies, such as the halogenides for tri-, also the pentachloride and hexafluoride. In a study of this subject G. E. Villar gives structural formulae for the oxides, the hydroxide or acid, the uranates and poly-uranates (mono-, di-, and tri-) and uranyl compounds—the fluoride, carbonate, and sulphate. There appears to be some evidence also of divalency; but in practically all the formulae given tetravalency predominates.

Some new products have been obtained by hydrolysis by E. A. Calderon from amine derivatives of fluorine, in a study of the chemical behaviour of some of the secondary aromatic derivatives, with and without substitution in the benzene nucleus. The most successful results were with nitro-2-fluorenyl-9-p-dimethyl-aminophenylamine.

It was generally found that these amines, substituted in the para position, dissociate into a fluorenol and an amine; and when not so substituted and similarly treated, hydrolysis does not take place. The two new products obtained were: nitro-2-fluorenol and nitro-2-fluorenyl-9-phenylamine.

E. J. Dubox describes a rapid method for the precipitation of ammonium phosphomolybdate, for the determination of phosphorus in steels, in which error is $< \pm 0.01$ per cent. (*A.A.Q.A.*, 1948, March.)

G. Loew gives yields and oil constants of three relatively little known oilseeds, namely, onion seed (*Allium cepa*), carozza almonds or kernels (from Durazno, Uruguay), and decorticated mani seed. The first contains 8 per cent moisture and 18 per cent fatty material. The second has 9.5 per cent moisture in the whole nut and 7.6 per cent in the kernel, which, however, constitutes only a small part of the whole, and has an oil content of 44 per cent. The moisture content of the mani seed, including outer coating and germ, averages 6.2 per cent, and the oil content of the decorticated seed, including germ, is 40 per cent. Constants are given for both expressed and solvent extracted oil and f.a. and show some variation in sap. val. and i.v. according to process used. (*Ind. y Quim.*, March, 1948.)

Brazilian Formaldehyde

Project will Promote Plastics Output

ALBA S. A., Adhesives and Laticinios Brasil-America, is at present in process of constructing a new formaldehyde-manufacturing plant in Curitiba, Parana, Brazil, which is expected to make important contributions to the further development of the country's plastics and plywood industries. Installation of machinery is in progress, and production is expected to start in February next. The new plant will produce about 250 metric tons of formaldehyde monthly. (Brazilian consumption is about 400 tons per year.)

Output of the new plant will be used chiefly by plastics manufacturers. Alba S. A. itself will use approximately 100 tons monthly in its own plastics and synthetic-resin plant. It is also planned to develop sales of formaldehyde for disinfectants and the treatment of grain before planting, and in the manufacture of mirrors. Alba S. A. is also studying the markets for formaldehyde in other South American countries and the possibility of exporting to them if its entire production is not used domestically.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ELIMINAX, LTD., London, W.C. (M., 20/11/48.) October 14, £46,000 debentures; general charge.

FERRAND LUTTMER PLASTICS, LTD., Felpham. (M., 20/11/48.) October 15, £1000 debenture, to G. W. Farrand, Chichester; general charge.

INSULATION MANUFACTURING CO. (PLASTICS), LTD., Glastonbury. (M., 13/11/48.) October 5, mortgage and charge, to Midland Bank, Ltd., securing all moneys due or to become due to the bank; charged on showroom, offices, workshop, stores and house at corner of Northroad Street and George Street, Glastonbury, with machinery and fixtures, also a general charge.

SOLIDOL CHEMICAL, LTD., London, S.E. (M., 20/11/48.) October 14, £3500 (not ex.) charge, to Lloyds Bank, Ltd.; charged on Ashmead Works, Disney Street, S.E.1. *Nil. December 31, 1947.

Satisfactions

BRITISH CELANESE, LTD., London, W. (M.S., 20/11/48.) Satisfaction October 13, of debenture stock registered September 24, 1946, to the extent of £10,000.

COLLOIDAL DETERGENTS OF AUSTRALIA, LTD., London, S.W.1. (M.S., 20/11/48.) Satisfaction October 7, £300, registered July 9, 1936.

DURION, LTD., London, W. (M.S., 20/11/48.) Satisfaction October 8, £3000, registered December 20, 1935.

A. B. FOXALL, LTD., Wolverhampton. (M.S., 20/11/48.) Satisfaction, October 11, of charge registered November 6, 1947, to the extent of £2235 19s.

Receivership

VARPALAC LABORATORIES, LTD., 155a Cherry Orchard Road, Croydon. (R., 20/11/48.) Mr. Peter A. C. Vincent, 22 Surrey Street, W.C.2, was appointed receiver and/or manager on October 13, 1948, under powers contained in debentures dated February 19, 1946.

Company News

The nominal capital of **F. Gutkind & Co., Ltd.**, has been increased from £1000 to £40,000.

The financial statement to be presented at the third annual general meeting of the **Industrial and Commercial Finance Corporation, Limited**, to be held on December 7, shows that in the year ending September 30, 1948, confirmed advances and investments rose by about £3 million to £13½ million, and cash invested in loans and shares by about £5 million to £10½ million. The report of the directors shows a net deficiency of £113,249 to be carried forward at September 30, but after making certain adjustments the account balances with a trifle on the right side.

New Companies Registered

Antony Crop Driers, Ltd. (460,858). Private company. Capital £10,000. Manufacturers of fertilisers, manures, manufacturing chemists, etc. Directors: P. D. Morcom, H. S. Hurrell, A. W. West, R. A. Brood and H. A. Smith. Reg. office: The Parade, Liskeard, Cornwall.

S. E. Porter & Sons (Wales), Ltd. (459,769). Private company. Capital £12,000. Manufacturers, refiners and merchants of paints, varnishes, lacquers, waxes, synthetic and natural resins, plastics, oils, solvents and chemicals, etc. Directors: C. H. Porter, H. C. Porter, S. A. Porter (directors of S. E. Porter & Sons, Ltd.) and H. J. Bowen-Simpkins. Reg. office: Argall Avenue, Lea Bridge Estate, E.10.

Chemical and Allied Stocks and Shares

SENTIMENT in stock markets was encouraged by the Edmonton election figures, and the upward trend in prices made headway, led by still further strength in British Funds. The latter were encouraged by the big success of the new Trinidad Loan, the premium established in initial dealings being up to 35s. Details of another gilt-edged issue will probably be known by the time these notes are in print.

Meanwhile, sharp gains have been made in 2½ per cent Consols and Treasury Bonds, and new high levels were attained by 3 per cent Transport and also by the new Electricity stock. There has been more business in industrial shares with prices moving moderately higher as a result. For the time being at any rate, markets are paying little attention to problems of inter-

national affairs, and there is an increasing volume of money seeking investment.

Imperial Chemical have changed hands at slightly over 48s. 6d., giving a yield of £4 2s. per cent, a not unattractive return, and there is continued confidence in the company's ability to maintain the 10 per cent dividend rate on the larger capital in future. In fact, with gilt-edged stocks still rising, there is likely to be a growing tendency to give more attention to leading industrial shares which combine good investment merits and more attractive yields than British Funds.

Other chemical shares remained more active, with Monsanto 5s. ordinary higher at 61s. 10½d. In this case the yield is only 3½ per cent (last year's dividend was 45 per cent), but this is an instance where higher dividends are expected when the Government's dividend limitation request is finally removed. Laporte Chemicals 5s. units were again changing hands over 21s., Fisons were 59s. 6d., Burt Boulton 28s. 6d., while British Tar Products 2s. 6d. shares transferred around 8s. 9d. Elsewhere, Borax consolidated deferred remained firm at 63s. 6d., and British Glues strengthened to 21s. 3d. At 48s., British Aluminium have been steady on the big debenture issue, while in other directions Turner & Newall were 79s., United Molasses strengthened to over 50s., the 4s. units of the Distillers Co. were 29s. 6d. and William Blythe 3s. shares have been dealt in over 20s.

Elsewhere, however, De La Rue receded to 37s. 6d. although, generally, shares of companies with plastics interests have been quite well maintained, British Xylonite being slightly over £5½. British Industrial Plastics 2s. shares were 6s. 10½d. and Erinoid 5s. shares 9s. 10½d. Dunlop Rubber improved to 75s. 6d. and Lever & Unilever were 51s. 10½d.

Shares of iron and steel companies have been firm and more have gone slightly above "take-over" levels. Yields on iron and steel shares are generally attractive, and it is being pointed out in the market that dividends should be maintained until 1950, when the question of nationalisation may in fact have to be decided by the General Election. William Beardmore have risen to 54s. 6d., which compares with a "take-over" level of 53s. 8d. Firth Brown were 78s. 9d. or moderately above the 78s. 2d. take-over. Stewarts & Lloyds at 56s. 3d., however, eased and are 1s. 1d. below their take-over valuation. On the other hand, Tube Investments, which is not being taken over, were active in response to the increased profits announced for the past year, and moved up to slightly over £6½. Renewed hopes that the London Metal Exchange may be reopened early in

1949 strengthened Amalgamated Metal shares to 21s. 7½d. and Metal Traders rose to 49s. 6d.

Allied Ironfounders rose to 67s. 6d. and Goodlass Wall were 37s. 6d. There was demand for Boots Drug which improved further to 58s. 3d. on reports of a big expansion in business arising from the National Health service. Sangers were over 33s. and Timothy Whites 39s. 1½d. Oils rallied with V.O.C. at nearly £6½, Iranian £8½ and Burmah Oil 70s. 7½d.

British Chemical Prices

Market Reports

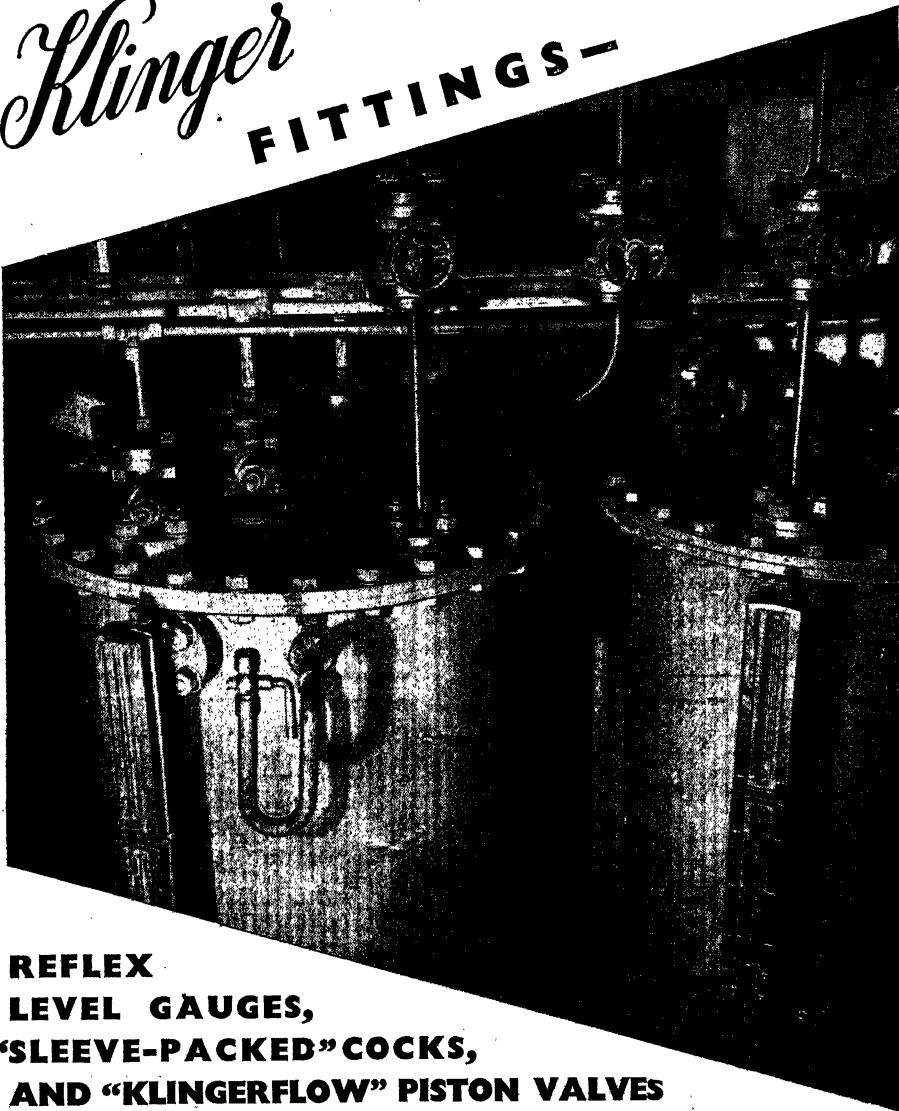
THERE has been little alteration in the general position on the industrial chemicals market during the past week. The volume of inquiry on home trade account and for shipment continues on a good scale and no important price adjustments have been reported. In the coal-tar products market business remains steady with buying interest sustained in cresylic acid, crude carbollic acid and pitch.

MANCHESTER.—Steady to firm price conditions remain in force in almost all sections of the Manchester chemical market. Trade during the past week has continued on steady lines, both as regards the volume of replacement buying and of additional inquiry, and the pressure for deliveries of textile chemicals has been well maintained, with a good demand reported also from the rubber and glass trades and other leading using industries. In the fertiliser trade there is a fair movement of supplies of basic slag, superphosphates and the compound materials. Pitch, crude tar, carbollic acid, and the benzols and other light products are in good demand on the tar products market.

GLASGOW.—Conditions in the Scottish chemical market have been a little quieter during the past week, although the volume of business being transacted is still running at a high level. Sales of imported lithopone have been made to the paint trade despite the high price. The Belgian material is selling at a price slightly lower than the German. Carbon tetrachloride continues to be scarce, as also is calcium chloride. Surprisingly, the agricultural demand for DDT has been maintained at a good level. The demand for formaldehyde for horticultural purposes is high, but the demand has been fully met. The supply position of Glauber's salts has eased considerably, and the present output is more than equal to demand. Blood albumen is also somewhat freer. The demand for toluol has been greater than the supply capacity of Scottish and northern English producers, but demand has been fully met from further south.

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Chemical Patents

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted may be obtained from the Patent Office, Southampton Buildings, London, W.C.2., at 1s. each.

Complete Specifications Accepted

Manufacture of interpolymers of polymerisable liquid esters with drying oils.—L. Berger & Sons, Ltd., and D. H. Hewitt. Feb. 15, 1946. 609,749.

Manufacture of interpolymers of styrene with polyhydric alcoholic mixed esters and of coating compositions obtained therefrom.—Berger & Sons, Ltd., L. E. Wakeford, D. H. Hewitt, and F. Armitage. Feb. 15, 1946. 609,750.

Manufacture of polymers.—E. I. Du Pont de Nemours & Co. March 6, 1945. 609,838.

Production of organo-silicon compounds.—A. E. Meadowcroft, C. Shaw, and W. E. Langrish-Smith. April 14, 1946. 609,841.

Desulphurisation of pig iron.—R. J. Tugwood. (Essex Research Corporation.) March 15, 1946. 609,850.

Solutions containing a high percentage of organically combined calcium.—Koninklijke Industriële Maatschappij Voorheen Noury & Van Der Lande N.V. Feb. 13, 1945. 609,608.

Method of producing ammonia from hydrogen and nitrogen.—S.-O. B. Odelhog. March 18, 1946. 609,756.

Organo-siloxanes and methods of preparing them.—Corning Glass Works. Feb. 26, 1942. 609,609.

Plastic bituminous material.—Louvroil-Montbard-Aulnoye. Oct. 27, 1944. 609,624.

Method of coating metal surfaces with metals.—Schori Metallising Process, Ltd. March 19, 1946. 609,644.

Resins and compositions containing the same.—American Cyanamid Co. July 17, 1945. 609,648.

Tubulous vapour generating and heating units.—Babcock & Wilcox, Ltd., and R. E. Zoller. March 20, 1946. 609,674.

Abrasive articles and method of manufacture.—Carborundum Co. April 6, 1945. 609,684.

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Easing the Way of the Student

"INDUSTRY is now realising that the advantages it obtains by having trained people to support its graduate staff should not be gained solely in what should be the leisure time of its employees; part-time day courses are rapidly increasing in number and importance." In those terms an important conference held earlier this year recorded two highly significant factors which are affecting the provision of education for industry and the use being made of it.

While it is by no means new, the necessity of providing training in what was once regarded as time solely devoted to work represents an important change in outlook, with which those who give their time and experience to the administration of technical education committees have had to become accustomed. The popularity of "evening classes," the route by which so many of to-day's leaders of industry found their way out of the rank and file, has conspicuously departed, and while the changed spirit will be lamented, it has to be recognised and provided for. That noble capacity for hard work without supervision, which still doubtless preserves a precarious hold, disguised under the designation "private study" in the university pass lists, is certainly far less common than it appears to have been in the days when the "merchant princes and captains of industry" were cadets. The circumstances which have encouraged belief that the trade union is the only proper and acceptable route by which improve-

ment in material conditions for the individual should be secured have not been without their effect.

The causes, however, are of less immediate importance than the conspicuous facts that there is a pressing need for trained men to carry on industrial processes in which the ordinary worker would be worse than useless, and so faint is generally the enthusiasm for acquiring such training that some degree of "spoon feeding" must be employed. The solution most generally favoured is part-time training and the provision of incentives for those who profit by it. That does not rule out the utility of evening classes, but it now seems highly improbable that these alone, without special incentives, will ensure the growing numbers of well equipped individuals without whom industry cannot be maintained on its present scale, far less equipped for the more exacting tasks which now lie before it.

If it is agreed that the present task is to train that more difficult body of young people who find study irksome we are bound to consider how their interest can be aroused. The Institute of Physics and Ministry of Education conference previously mentioned had little doubt that a subject such as Applied Physics cannot be taught successfully to most students in the university way. A thorough mastery of often difficult theory, as an aim in itself does not appeal to many of the new part-timers, and is completely unsuitable for most of them. Dr. H.

On Other Pages

Leader :

<i>Easing the Way of the Student</i> ...	709
<i>National Industrial Colleges</i> ...	710
<i>Notes and Comments :</i>	
<i>Fourfold Increase</i> ...	711
<i>Steel Research</i> ...	711
<i>Memorial to Genius</i> ...	711
<i>Free Miners</i> ...	712
<i>The State and the Scientist</i> ...	712
<i>U.S. Output Surpassed</i> ...	712
<i>High Level of Chemical Exports</i> ...	713
<i>£13 Million Alkali Extension for I.C.I.</i> ...	714
<i>British Fluorine Chemicals</i> ...	717
<i>Steel Authorisations</i> ...	718
<i>Export Licensing Changes</i> ...	718
<i>Electronics in Industry</i> ...	718
<i>Czech State Monopolies</i> ...	719
<i>Coal Carbonisation</i> ...	720

<i>Unqualified Opposition to Steel Bill</i>	720
<i>India's Steel Plan</i> ...	720
<i>Industrial Production in Germany</i>	721
<i>Europe's Rising Fertiliser Capacity</i>	721
<i>Synthetic Optical Lenses</i> ...	722
<i>Wood Pulping with Magnesia</i>	724
<i>Synthetic Fibres</i> ...	725
<i>Trace Elements in Animal and Plant Nutrition</i> ...	726
<i>New Swedish Phosphates</i> ...	726
<i>Twenty-first Industrial Chemical Congress</i> ...	727
<i>A Chemist's Bookshelf</i> ...	728
<i>Technical Publications</i> ...	729
<i>Mechanical Mica Splitter</i> ...	730
<i>Death of Mr. R. M. Drake</i> ...	732
<i>Liver Extracts</i> ...	732
<i>Rewards and Duties of Industrial Chemists</i> ...	734
<i>Prices of British Chemical Products</i>	737

Lowery, of the Institute, holds that such teaching should be by a method which he called the "principle of freedom"; the interest of the student is first attracted by applications that he can appreciate and he will then want to understand the fundamentals.

Illustrating what this involves is the conclusion of Dr. Lipson (*The Journal of Scientific Instruments*): Mechanical engineering students, he says, will be familiar with heat engines, and will know that they depend on the expansion of a gas when heated. This leads to a study of gas laws, and Boyle's Law apparatus immediately has practical significance that was not obvious before. Also the metal in the engine is heated; how does this affect the problem? Specific heats and coefficients of expansion are introduced; the value of simple experiments with water, calorimeters and pieces of brass will be appreciated, and so the students will get the most out of them.

As Dr. Lipson indicates, the elements of physics cannot be widely taught as a series of mathematical formulae; and the obligations of the teachers clearly cannot honourably end with imparting the bare elements. Part-time courses should endeavour to be truly educative. "There is," says Dr. Lipson, "a further aim, which the skilful

teacher will introduce unostentatiously during the course—that is the philosophical content of physics, the spirit of inquiry. . . . The majority of his class will continue to assess a teacher's ability on the percentage of passes in examinations; but there are some who will really appreciate this part of the teaching and who will feel its influence on their work to the end of their days."

The joint conference certainly has not over-simplified the problem. It has helped to show that it is not enough to provide classes; and, most important, there must be adequate numbers of good teachers. The last is perhaps the most stubborn problem of all.

National Industrial Colleges

In reply to a question by Mr. H. D. Hughes in the House of Commons, the Minister of Education, Mr. Tomlinson, said that the following national colleges for various industries had so far been established: National College of Rubber Technology; National College of Horology and Instrument Technology; National Foundry College; National College for Heating, Ventilating, Refrigeration and Fan Engineering; and the College of Aeronautics. He also gave the names of members of the respective governing bodies.

NOTES AND COMMENTS

Fourfold Increase

IN estimating the contribution made by the various branches of chemical industry to the excellent returns of £140,100,000 for United Kingdom exports as a whole in October it is gratifyingly apparent that the increment since 1938 is greater than that of nearly all other industries. While the total for all exports is 42 per cent higher than in 1938, the chemical group's £7,171,891 in October (£6,210,775 in 1947) is nearly 400 per cent more valuable than the monthly average in the pre-war year. Such comparison cannot, of course, fairly be drawn without regard to a number of factors operating in favour of chemical industry, especially that so many of its products are indispensable, but from the purely financial standpoint there is presented a very strong case for giving preference to the needs of chemical manufacturers for export. All groups of chemical production have shared in the continued high level of trading, which in 10 months this year has yielded £69,392,094 in foreign currency. Conspicuously the largest advance since October last year was registered by industrial and agricultural chemicals, whose month's total of £4,104,857 represented an improvement of more than 20 per cent, only a small part of which can be attributed to the rising trend of prices (*Export-import summary page 718*).

Steel Research

"NO research—no jobs," said Mr. Herbert Morrison, speaking to industry in Scotland last week. His words would serve as a basis of an illuminated address which we would like to present to each of the sponsors of the Iron and Steel Bill. If they are ever called upon to implement its proposals it would be a useful touchstone. The subject is underlined by the fact that nearly every one of the 107 leading firms earmarked for State control is a member of the British Iron and Steel Research Association, whose contribution to the development of the industry, in common with kindred groups like the British Cast Iron Research Association, has been indispensable. One of the most recent examples, the nodular graphitic cast iron resulting from research supported by

the latter organisation (THE CHEMICAL AGE, May 1, June 5 and 12), was acclaimed as "the most notable metallurgical advance for many years." That was the ungrudging recognition given by American experts. Such instances might be multiplied indefinitely by reference to the industry's literature. Can such work be sustained with the same vigour if so many who in the past have contributed so amply to the finances and the technology become "independent" components of a State corporation? The Iron and Steel Research Association, is reassuring on the subject, telling THE CHEMICAL AGE of its firm belief that its traditional supporters would not be prevented from offering their vital contributions as they did in the past. That support latterly had been "magnificent" and the liberality of the administration by the DSIR of Government grants for the same object is being taken as a pledge that narrow bureaucratic doctrines would not be allowed to dam the stream. Even so, it cannot be too widely advertised that if the ability of individual undertakings to support this work at their own discretion and the freedom of research groups to formulate their policy are ever endangered the results in future years might be disastrous.

Memorials to Genius

RECOLLECTIONS of the brilliant achievement by individuals on which was founded what has come to be known around the world as "I.C.I." were brought to life in many ways during the 75th anniversary celebration in Cheshire last week of the Winnington Works of I.C.I., Ltd. (Alkali Division) (page 714). As eloquent as any is the preservation in the neighbourhood of a colloquial custom of referring to Winnington as "Brunner Mond's," an unthinking tribute to the founders, one of whom was also commemorated in the spade with which a memorial copper beech tree was planted. The alloy of Mond nickel forming the blade served to recall the fairy tale-like origins of this and a family of alloys in Dr. Ludwig Mond's laboratories when Carl Langer was a promising young chemist studying the action of carbon monoxide on nickel with a view to solving a Winnington Works problem

associated with the bleach plant. Quite accidentally, Carl Langer observed that the flame of the surplus carbon monoxide, as the nickel burner cooled at the end of the day's work, turned green-yellow and became progressively brighter. That was the effect—as Carl Langer later established—of a gaseous compound of nickel and upon the imaginative exploitation of that was founded the Mond Nickel Company and later the £5.5 million International Nickel. Laboratory assistants had witnessed that odd flame phenomenon many times without remarking upon it. The imaginative perceptiveness of a trained mind found in it the germ of a great new industry.

Free Miners

PPRIVATE enterprise has raised its much abused head once more, at Wirksworth, Derbyshire, in circumstances which contrast very oddly with the widely propagated view that such activity is the anti-social usage of capitalists. The industrial group concerned here is represented by Mr. F. C. Upton, a Derbyshire quarryman, his brother and a few friends to whom the ancient Great Barmote Court of Wirksworth has awarded the ownership of the lead vein which they found and have worked in their own time for nearly a year in the limestone quarry where they are employed. Not only had they satisfied the ancient requirement of raising enough lead in 14 days "to fill a standard dish": they were said already to have mined 11 tons of ore and got around £1400 for it. The story is a manifest anachronism; no one for 25 years has called for the arbitration of the once active Barmote on such a case as this. But the enterprise and energy which it mirrors is of a tradition embracing Brunner, Mond and a host of others, which so much of contemporary legislation seems designed to extinguish.

The State and the Scientist

ASTRONG witness for the defence of government-sponsored research received a respectful hearing from the Royal Society last week. Even while paying due regard to the fact that the speaker's experience concerned Australia, where the need for fundamental research is naturally subordinate to the practical direct uses of science in agriculture, what Dr. H. R.

Marston had to say about the independence of his own biochemistry and nutrition division of the Australian Council of Scientific and Industrial Research helped to present a reassuring picture from the scientist's viewpoint. He and his colleagues at Adelaide University suffered from none of the hampering influences which are generally suspected of operating in any kind of public service department. Their terms of reference were scientific research, he said, and there was nothing to stop his team from getting on with that job. It was a practical experiment in government administration without government interference or officialdom. A common curiosity kept them together as a team without loss of individuality. Dr. Marston described how he and his team were enabled, in those favourable conditions, to bring to fruition their research into factors affecting wool production, notably trace elements and their rôle in animal and plant nutrition. They had clearly established that some of the deficiency diseases in sheep were directly traceable to the absence, or low content, of cobalt, copper, zinc or molybdenum in the soils, and the addition of these elements had had gratifyingly successful results. One reward had been a marked improvement in the quantity and quality of the wool, and the means was now at hand to bring into useful production many millions of acres of refractory terrain, some of which had been abandoned as being useless.

(Summary: page 726)

U.S. OUTPUT SURPASSED

OUTPUT of workers in the British cement industry is higher than in the U.S.A. This was the only industry in the United Kingdom in which the British worker excelled the American, according to a survey of labour productivity made for the International Labour Organisation.

The report prepared by Mr. L. Rostas (United Kingdom) showed that over a five-year period the U.S. factory worker's output was 2.2 times as high as that of his counterpart in the U.K.

The difference in output was less marked in service, distribution, building and construction industries, while in agriculture and transport productivity was about equal. Better natural conditions were stated to be the cause of higher output in American mining industry.

High Level of Chemical Exports

Total for All Groups Over £7 million

THE excellent export performance of the chemical industry this year is borne out by the figures for October published in the latest issue of *Trade and Navigation Accounts of the U.K.* (HMSO 4s. 6d.). The value of chemicals, excluding drugs and dyestuffs, exported from the United Kingdom in October, although not quite so high as the previous month, was £4,104,857 as compared with £3,474,432 in October, 1947. The corresponding total in September this year was £4,334,005.

CHEMICAL EXPORTS

	Oct., 1948	Oct., 1947
	Cwt.	Cwt.
Formic acid	3,539	1,785
	Lb.	Lb.
Salicylic acid and salicylates ...	184,056	127,815
	Cwt.	Cwt.
Tartaric acid	584	402
Value of all other sorts of acid ...	£86,325	£46,482
	Tons	Tons
Aluminium oxide	648	107
Sulphate of alumina	3,463	2,976
All other sorts of aluminium compounds	458	288
Ammonium sulphate	25,104	19,891
Ammonium nitrate	9,520	12,524
All other sorts of ammonium compounds	2,098	902
	Cwt.	Cwt.
Bleaching powder	21,218	42,192
All other bleaching materials ...	9,717	7,414
Calcium carbide	7,300	1,461
	Gal.	Gal.
Benzol	2,366	6,794
Cresylic acid	184,081	198,283
Tar oil, creosote oil, anthracene oil, etc.	1,580,087	2,295,981
Value of all other sorts of tar oil ...	£37,627	£16,396
	cwt.	cwt.
Naphthalene	10,793	1,188
Collodion cotton	1,062	2,238
	Tons	Tons
Copper sulphate	1,221	1,900
	Cwt.	Cwt.
Disinfectants, insecticides, etc. ...	50,535	69,903
	Tons	Tons
Fertilisers	979	1,821
	Cwt.	Cwt.
Glycerine	9,040	281
Nickel salts	5,967	11,141
Lead acetate, litharge, red lead, etc.	17,188	7,304
	Tons	Tons
Magnesium compounds	909	731
	Gal.	Gal.
Methyl alcohol	13,971	98,954
	Cwt.	Cwt.
Potassium compounds	7,970	7,414
	Tons	Tons
Salt	10,995	15,049
	Cwt.	Cwt.
Sodium carbonate, etc.	401,165	162,717
Caustic soda	182,998	165,272
Synthetic sodium nitrate	73	—
Sodium silicate	27,874	10,518
Sodium sulphate	39,884	3,481
Creosote of tartar	371	123
Tin oxide	562	692
	Tons	Tons
Zinc oxide	1,862	1,162
Total value of chemical manufactures, excluding drugs and dyestuffs	£4,104,857	£3,474,432

The total for all the main chemical groups—chemicals, drugs, dyestuffs and colours—was £7,171,891, compared with £7,522,145 in September.

All the acids show an increase in quantity and there was a considerable rise in the figures for aluminium oxide, sulphate of alumina and all other sorts of aluminium compounds. Potassium compounds were lower than September, but slightly higher than October last year. Representative figures are:—

	Oct., 1948	Oct., 1947
	Oz.	Oz.
Quinine and quinine salts	198,787	116,658
	Lb.	Lb.
Acetyl-salicylic acid	81,537	49,478
	100	100
	Inter-	Inter-
	national	national
	units	units
Insulin	1,231,807	759,812
	Mega	Mega
	units	units
Penicillin	314,672	210,597
Total value of drugs, medicines and preparations	£1,357,931	£1,295,477
Total value of dyes and dyestuffs ...	£642,184	£600,158
	Cwt.	Cwt.
Plastic materials other than casein and celluloid, etc.	40,677	27,545
Value	£450,468	£308,338
	Cwt.	Cwt.
Chemical glassware	1,506	1,696
Value	£44,276	£40,662
	Tons	Tons
Furnace plant	361	631
Value	£68,976	£93,640
	Tons	Tons
Coal	1,174,182	81,192
Value	£4,388,959	£191,574

CHEMICAL IMPORTS

	Oct., 1948	Oct., 1947
	Cwt.	Cwt.
Acetic acid	21,962	13,360
Boric acid	—	1,000
Tartaric acid	—	—
All other acids	4,107	3,436
Borax	9,900	2,940
Bromine and bromides	—	1,769
Calcium carbide	67,373	9,645
Coal tar products, excluding benzol and cresylic acid	14,511	4,996
Cobalt oxides	742	446
	Tons	Tons
Ammonium phosphate	—	—
Arsenic	422	430
Fertilisers	20,797	4,654
	Lb.	Lb.
Iodine	67,058	313,120
	Cwt.	Cwt.
Potassium chloride	841,273	455,079
Potassium sulphate	12,800	31,000
All other potassium compounds ...	4,008	4,381
Sodium nitrate	79,760	29,910
All other sodium compounds	2,605	3,252
Carbon black	60,671	63,393
Total value of chemicals, drugs, dyes and colours	£2,662,843	£2,364,532

£13 M. ALKALI EXTENSION BY I.C.I.

Announcement at 75th Anniversary Celebrations



Lord McGowan plants the memorial coppice beech, watched by Mr. W. M. Inman, chairman of the Alkali Division, and helped by a junior member of the Lostock works staff

LORD MCGOWAN, K.B.E., chairman of Imperial Chemical Industries, Ltd., presiding at the 75th anniversary celebrations, last Saturday, of the foundation of the company's Winnington Works, Northwich, Cheshire, announced plans for extensions of the factories in the mid-Cheshire area within the firm's Alkali Division at an estimated cost of £13 million.

The guests at luncheon, held in the Crescent Hall, Winnington—which is actually one of the large staff canteen buildings—included leading public men of Lancashire and Cheshire, representatives of the Brunner and Mond families, political leaders and industrialists from home and overseas, and some 250 Winnington employees.

The principal guest was M. Ernest John Solvay, Belgian industrialist of international fame and head of the firm of Solvay et Cie., originators of the first successful commercial method for producing alkali by the ammonia-soda process. The process was actually perfected by his grandfather and founder of the firm, M. Ernest Solvay, who floated the company in 1863 on the basis of a chemical reaction which, although known to the world's leading chemists for years previously, had consistently defeated all efforts to make it a commercial proposition.

Solvay et Cie. started production at Couillet, Belgium, two years later. Still a "family" business, despite its world-wide ramifications, Solvay et Cie. is the largest alkali producer on the Continent, with large plants all over Europe and important interests in America.

M. Solvay, in proposing the toast of "Winnington Works," said the greetings and good wishes which he brought from Solvay et Cie. represented deep-rooted feelings. The leaders of both companies had for a long time worked together, tackling the same problems and solving their common difficulties, which had contributed in no small measure to the building up of the wonderful organisation at Winnington Works.

Terms of Friendship

The relationship between his company and the great alkali organisation here represented something quite unusual in the history of the world—two companies of great importance going along hand in hand, winning, not only for their own countries, but for all the countries of the world, better conditions of labour, better ways of living, better manufacturing processes, and helping the people in the difficulties of their daily lives.

A cordial tribute was paid by M. Solvay to the leaders of both undertakings for their ability and the spirit of co-operation which had enabled them to get things done. Suspicion too commonly stopped men from



Studying the ceremonial spade of Mond nickel alloy are (from the left) Sir Frederick Bain, Lord McGowan and the chairman of the Alkali Division

doing things, said M. Solvay, but suspicion, he was pleased to say, had always been entirely absent from the relationships existing between the two organisations. In the early days, when big things were done, honest men had got together, with the result that they all knew.

M. Solvay said he was sure that whatever they had to fight in the future, they would win through together. It would always be the big men with initiative and free enterprise who would take the world further on its course.

Lord McGowan, responding to the toast, said that to attempt to discuss Brunner, Mond without mention of the name Solvay would be as senseless as to tell the story of Gilbert and Sullivan without reference to d'Oyly Carte. The name of M. Solvay's illustrious grandfather was linked for all time with those of John Brunner and Ludwig Mond.

"Only a vintage generation could have produced three such men, so vastly different in blood and background, but the Finger touched all three, and their genius made them kin," said Lord McGowan.

When organised British labour to-day congratulated itself—as well it might—on the "new deal" in industry, he hoped it

did not forget that Sir John Brunner was a pioneer of the improved conditions that the British working man enjoyed to-day. In referring to those two great figures of the past, Ludwig Mond and John Brunner, he did not forget the late Lord Melchett, with whom he had the closest co-operation for many years. He was a great person, with indomitable courage and imagination. He regretted the absence on that occasion of his very dear personal friend, the present Lord Melchett, who had suffered a grievous illness for nearly four years.

M. Ernest Solvay had re-created for them the great past of Winnington Works. It was now his opportunity to say something of their future. The greatest alkali-producing plant in the country, which contributed so greatly to the country's war effort, and whose chemists discovered that invaluable material, polythene (which enabled radar to be such an outstanding achievement), was on the verge of great developments.

The extensions they visualised in the factories within the Alkali Division would cost not less than £13 million. That sum would be spent on extensions of manufacturing facilities which, with the extensions now nearing completion, would add more than 50



Some of the pensioners of the I.C.I. organisation greet the chairman at the staff's social centre, the ancient Winnington Hall, once the home of Ludwig Mond and John Brunner

per cent to their present alkali capacity. No doubt that ambitious plan would not be accomplished without difficulties. But, then, they were not unaccustomed to difficulties, and to overcoming them.

Soda Ash Prospects

The scheme should be complete by the end of 1953, but that would depend on a number of factors, especially on the question of getting the buildings and plant. If, as a result of the international situation, they were called upon to do their part—as they would be—in a new defence programme, that, of course, must have the highest priority.

Of the market prospects, Lord McGowan said it was a fact that over the past 25 to 30 years the consumption of soda ash had increased every year, and they saw no reason why that should not continue. Naturally, no tree grew to heaven, and it might be they would see recessions in the demand for soda ash, but in his opinion that would only be temporary and, in any case, they would rather see an over-capacity than inadequacy.

Whatever happened, the scheme was going to involve big changes in the district. In the surrounding villages, the effects of their expansion would be marked. Their plans must misfire unless they could add another 3000 men or more to their payroll within the next five years. Large numbers of those men must come from other districts. He had no worries about their reception—the hospitable people of mid-Cheshire would see to that. But a good job and a warm welcome were not much good unless decent accommodation went with them.

Hitherto, they had been greatly disturbed by the housing situation. He was glad to record that now all was set for the construction of 3000 houses in the Northwich rural district over the next five years, and of those no fewer than 2000 would be allocated to their employees.

He was glad they had so many of their Trades Union friends there that day. Winnington had a tradition of friendship and mutual respect between management, workers, and their representatives going back to the very beginning of the enterprise. Ludwig Mond was more than a great chemist; he was an industrial reformer. It was an almost unheard-of thing when Brunner, Mond introduced holidays with pay in 1884, and again in 1889 when they cut working hours from twelve to eight. That was an example of human relationship, and he said with pride that this sympathetic and progressive policy had been fostered in their company ever since.

The principle of joint consultation was already established at Winnington when

some present were mere boys. Yet, to hear some people speak, one would think joint consultation was something new! The movement received fresh impetus during the war when production committees were set up as part of the organisation's works council scheme. He was glad to say that these committees were still flourishing, and the value of the work they did was unquestionable.

I.C.I. laid great stress on safety measures, and indeed on all matters affecting the welfare of the 90,000 men and women who constitute their team. That was only common sense for their manpower was their greatest asset although it did not show up in the balance sheet. He congratulated their colleagues from Fleetwood who had recently worked two million man-hours without a lost-time accident.

He made no secret of his apprehension over the Government's programme for nationalising certain industries such as iron and steel. He feared the dead hand of bureaucracy, which in his view was bound in the long run to infiltrate into these nationalised industries, and he did not believe for a moment that Government ownership of an industry would cause it to be more efficient. Management must take risks, and if these risks failed then the management could be dismissed by the shareholders. It was not so in a nationalised industry, and he viewed with anxiety the future of those industries which were now under public ownership.

Risks and Rewards

No Government-controlled organisation would have taken the risks that Ludwig Mond and John Brunner had to accept when they began their business. They knew how those two walked the tightrope of near bankruptcy while they were being buffeted by the cruellest of luck. They knew how they stormed the houses of Manchester and Liverpool in search of orders when there was nothing in the till, and borrowed wherever they could to meet the weekly payroll. No, he thought the bureaucratic mind would have wanted to wind up what they would think was their mad venture soon after its inception—and how much poorer this nation would have been to-day!

Expressing thanks to M. Solvay, he said that had it not been for the Solvay family, there might never have been a Winnington Works. In Winnington, the memory of M. Solvay's grandfather would always be green.

The toast of "The Guests" was proposed by Sir William Coates, a deputy chairman of I.C.I., and responded to by Mr. John Foster, M.P. for Northwich.

BRITISH FLUORINE CHEMICALS

Commercial Supplies Available Early Next Year

THE prospect that the first of a variety of fluorine compounds to be produced in this country will be available early next year is reflected in a Press statement issued by Imperial Chemical Industries, Ltd.

For many years fluorine compounds were represented commercially only by a few simple inorganic products. Large-scale organic fluorine chemistry started with the production of fluorochloro-methanes and -ethanes as refrigerants. During the war, research into fluorine chemistry advanced considerably because of the need for special materials for the atomic energy projects, and the literature now contains many references to fluorine compounds made primarily for this purpose.

I.C.I. now announces that it is operating pilot plants for the production of anhydrous hydrogen fluoride, difluorodichloromethane, difluoromonochloromethane, and monofluorotrichloromethane, the last three to be known by the trade names Arcton 6, and Arcton 4, and Arcton 9 (American imports are sold as Freon 12, 22, and 11). A pilot plant is also making polytetrafluoroethylene. Large-scale production of anhydrous HF, Arcton 6 and Arcton 9 should start early in 1949, sufficient in quantity to satisfy all U.K. demands and provide a surplus for export.

During the war, I.C.I. carried out extensive research in the general field of fluorine chemistry, but as this work was largely connected with war needs it was therefore secret. This research has enabled them to design pilot plants for many new products which it is hoped will be available early next year for development purposes. These materials include chlorine trifluoride, carbon tetrafluoride, sulphur hexafluoride, cobalt trifluoride, trifluoroacetic acid, trifluoroethanol and a range of fluorinated aliphatic and aromatic hydrocarbons, some fully fluorinated and some with chlorine and fluorine substituents. It is already possible to supply small quantities of chlorine trifluoride and some materials such as perfluoromethylcyclohexane.

Only Products and Intermediates

Elementary fluorine is already being made in significant quantities on the pilot plant scale, and will be made in much larger quantities. I.C.I. states that it intends to sell not fluorine itself, but the products and intermediates made directly from it. The elementary fluorine could only be supplied as a compressed gas which makes its use uneconomic. In this form its rate of reaction is increased and the elaborate safety

precautions which are required add to the cost of complication of using it.

For some purposes which fluorine might be used, chlorine trifluoride, containing 61.7 per cent of fluorine and 38.3 per cent of chlorine, is an alternative. This compound has a boiling point of 11.3°C. so that it can be packed and sold in liquefied gas containers at little more than atmospheric pressure and though it has much of the reactivity of fluorine it is not held under high pressure with the added risk which that entails. It is nevertheless a dangerous chemical, and stringent precautions will always have to be observed when using it.

Another useful fluorinating agent is cobalt trifluoride, a stable solid, which has one highly reactive fluorine atom. Other higher metallic fluorides will also be made available if they are required for this purpose.

New Basic Chemicals

I.C.I. hopes to meet three needs with this range of fluorine compounds. First, to provide a British source of the well-known fluorochloro refrigerants, which will soon be available in large quantities.

Second, to supply the rest of the industry with the basic chemicals needed to develop new fluorine-containing products and to establish their manufacture. Cobalt trifluoride, chlorine trifluoride and higher metallic fluorides have already been mentioned as fluorinating agents. Hydrogen fluoride can also be used to introduce fluorine into organic molecules either by addition or by exchange of fluorine with substituents already present. It is also a valuable catalyst in some condensations. Trifluoroethanol and trifluoroacetic acid are valuable by virtue of the $-CF_3$ groups and should be useful reagents when it is desired to make other molecules including this group.

The third group of compounds will be fluorocarbons and fluorochlorocarbons. In contrast with the fluorinating agents such as fluorine, chlorine trifluoride and cobalt trifluoride, these substances are safe.

Fluorocarbons are the analogues of hydrocarbons with fluorine in the place of hydrogen, and are marked by outstanding properties of non-inflammability and chemical inertness.

In the fluorochlorocarbons both halogens are present in place of hydrogen, but the reactivity of the chlorine is much diminished compared with that in chlorinated hydro-

(Continued overleaf)

Steel Authorisations

Fewer Forms Will be Needed

A SUBSTANTIAL easing of the difficulties in securing authorisations to acquire small quantities of steel was foreshadowed by statements at a Press conference held by the Minister of Supply, Mr. G. R. Strauss, in London this week. He said that after January next fewer authorisations would be required in the steel industry. It would benefit in particular firms which used and sub-authorised less than 25 tons of steel in each quarter, and whose total steel consumption including sub-authorisation did not include more than 10 tons of steel sheets. The steel allotted to such firms must be for industrial purposes, use in manufacture or further processing, use in industries such as mining and quarrying, or for the maintenance and repair of plant.

One effect would be to reduce by about 250,000 the number of licences and authorisations needed, affecting some 30,000 firms.

Iron castings would cease to be controlled.

BRITISH FLUORINE CHEMICALS

(Continued from page 717)

carbons. The fluorochlorocarbons are only a little less inert and less stable than the fluorocarbons and they are equally non-inflammable. Most members of both groups of compounds are of low toxicity.

Apart from conferring notable stability, fluorine substitution in a molecule increases the density considerably and reduces the refractive index, boiling point, viscosity and solvent power compared with the corresponding hydrocarbons.

It is hoped to produce compounds, in this class, with properties to suit particular demands. Industry will be able to consider the use of fluorocarbons and fluorochlorocarbons from the wide range which will be offered by I.C.I., including the plastic polytetrafluoroethylene, liquids such as perfluoromethylcyclohexane (boiling at 76°C.) and carbon tetrafluoride, a permanent gas of remarkable inertness. (Like sulphur hexafluoride, carbon tetrafluoride may be found to have valuable properties as a gaseous dielectric.) Later, it is intended to extend the range by including inert fluorinated greases and waxes.

It should be noted, however, states I.C.I., that as far as can be seen at present fluorine compounds will always be relatively expensive. Their use, therefore, will be in applications for which cheaper materials cannot be used, and where their special properties will justify the extra cost.

Export Licensing Changes

Chemical Items Affected

CHANGES in Export Licensing Control are made by a Board of Trade Order (S.I. 1948, No. 2473) which came into operation on November 26.

Among those goods which will not require export licences after that date are certain plastics materials and paints, lacquers, distempers and pigments in medium other than than those specified in the schedule. Licences are now required for beryllium in some forms and further types of scientific equipment. The relevant changes are:—

Group 3.—The heading relating to glue, gelatine, etc., is amended to read:—“Glue, gelatine and size derived from animal or fish, and mixtures (other than printers' roller composition) consisting wholly or mainly of such glue, gelatine or size.”

Group 6 (1).—“Beryllium is added to the list of items under the headings relating to non-ferrous metals and alloys, and ores and concentrates.”

Group 8.—The item “Polymers of vinyl chloride, co-polymers made mainly from vinyl or polyvinyl chloride, and compositions consisting mainly of any of these materials, in the form of rough sheet, strip, powder, granules or chips” is deleted.

Group 13 (1).—The items relating to carbon blacks and chromium compounds are amended to:—“Carbon blacks and mixtures containing carbon black, but not including lacquers, paints, paste paints and painters' enamels” and “Chromium compounds and preparations thereof, but not including lacquers, paste paint and painters' enamels.”

Group 15.—A list of scientific equipment is inserted.

ELECTRONICS IN INDUSTRY

DESCRIBING electronics as one of the most fruitful branches of science, Sir Edward Appleton, director of the Department of Scientific and Industrial Research, opened a symposium on electronics in scientific research, arranged by the Scientific Instrument Manufacturers' Association at Caxton Hall, last week.

The variety of methods in which electronics could be used in industry, Sir Edward noted, included detecting internal flaws in castings, impurities in textiles and plastics, and moisture in stored grain as well as the presence of harmful rays.

The introduction of electronic equipment in industrial processes, he continued, had resulted in remarkable economies, and all firms should endeavour to share the advantages. To assist, the DSIR had set up an advisory group of experts who would visit firms and demonstrate.

CZECH STATE MONOPOLIES

Canadian Summary of Chemical and Allied Concerns

THE extent to which nationalisation has been carried in Czechoslovakia has not been precisely defined in the several summaries, official and otherwise which have been published in recent months, although sufficient has been revealed to leave no doubt that there remains in the chemical industry and several others no longer scope for independent operation on a considerable scale. The recent visit by a delegation from the Association of British Chemical Manufacturers (THE CHEMICAL AGE, October 9) has so far not resulted in any public statement dealing with the economic considerations of chemical production in Czechoslovakia.

Supplementing the piecemeal information which THE CHEMICAL AGE has given whenever it has been available, a fairly detailed review has now been assembled by the Canadian Commercial Counsellor in Switzerland. This, published in *Foreign Trade* (October 23) an organ of the Canadian Department of Trade and Commerce, leaves little doubt how comprehensive are the six State monopolies which began operation on September 1, and of which Chemapol (Panska ulice 3, Prague 2) the government joint stock company controlling the import and export of chemical products and raw materials, is one of the more important. In addition, the present Government retains close control of imports and exports of all forms and of forwarding and despatching and the Minister of Foreign Trade has the authority to nationalise at the briefest notice any concern carrying on foreign trade or forwarding.

Chemical Raw Materials

The purpose of the Chemapol Company, the Commercial Counsellor records, "is to handle raw materials, semi-manufactures and auxiliary materials required in the manufacture of chemical products, fats and fuels, including paraffin, tar, pitch, asphalt, ceresine, vaseline, lanolin, grease, charcoal, pyrites, chrome ore, ilmenite, chalk, phosphates, resins, turpentine, shellac, mineral oils, natural and artificial waxes, sulphur, glycerine, anthracene, naphthalene, formaldehyde, carbolic acid, synthetic resins, phenol. It will also handle packing material and equipment for the chemical industry. It can accept the representation of foreign firms."

In a closely associated field is the Oleapol Company for the importation and exportation of oleaginous raw materials (Stepanska 64, Prague 2). This now monopolises the trade in oleaginous seeds, fats

and oils. Foreign trade in animal fats and oils, and products such as soap may eventually be centralised under this concern.

Czechoslovak Ceramics Export and Import, Ltd. (U Pujcovny 9, Prague 2), will handle ceramics of all kinds, such as raw materials and finished products. Among the materials mentioned are felspar, flint, gypsum, barytes, barium sulphate, cryolite, kaolin and other clays, sand, bauxite and other earths, and a number of categories of earthenware and porcelain products. Laboratory ware, however, is excluded.

Glass

The outward and inward trade in glass, glass materials and apparatus comes under the sole control of the Czechoslovak Glass Export Co., Ltd. (Revolucni 2, Prague 2). As the first stage, the company has been appointed the sole exporter of bottles, glass tiles and window glass.

The other two State trading monopolies are Centrox, Ltd. (textile materials and manufactures) and the Czechoslovak Hop Export, Ltd.

"It is expected," says the Counsellor's report, "that the next branches for which foreign trade organisations will be set up will be machinery and metallurgical products, sugar, and international transportation. Eventually foreign trade will be in the hands of 20 or 30 privileged concerns."

Law 119 (April, 1948), which is the authority for taking control of foreign trading and shipping, stipulates that all financial transactions will be conducted through the Zivnostenska Bank National Corporation, Prague.

STATE CHEMICALS OBJECTIVES

THE tasks that lie ahead of the Czechoslovakian chemical industry under the new five-year plan, now that the industry has been nationalised, have lately been reviewed by the general manager, M. Tichy. He gave an optimistic forecast of future achievements. Turnover, he said, was expected to reach 35 milliard crowns in 1953, as compared with 21.7 milliard crowns in 1948.

By the end of the five years it was planned to increase output by 25 per cent. which would enable the chemical industry to rank third, after metals and textiles.

It was hoped, according to this speaker, that the Czechoslovak industry would take over the dominant rôle in European chemicals, held before the war by Germany.

Coal Carbonisation

Products Being "Silently Nationalised"

A WARNING on the extent to which the products of coal carbonisation, in addition to coal gas, are being "silently nationalised," was given by Sir Walter Benton Jones, in the course of his circulated address as chairman of the United Steel Companies, Ltd., recently. He was dealing with the past year's activities of the subsidiary concern, the United Coke and Chemical Co., Ltd.

Sir Walter Benton Jones said in round figures 40 million tons of coal were carbonised annually in the United Kingdom, of which the nationalised gas industry carbonised rather more than 50 per cent, and the nationalised coalmining industry carbonised about 20 per cent, leaving about 30 per cent in the hands of free enterprise, of which the iron and steel industry carbonised more than 20 per cent.

10 per cent Free

If the iron and steel industry were to be nationalised something less than 10 per cent would be left under free enterprise, and nationalised industries would have in their own hands nearly the whole of the products of coal carbonisation.

The object of the Act to nationalise coal was to own and control the production and sale of coal, and the object of the Act to nationalise gas was to control the making and distribution of gas. In both cases the legislation had the effect of gathering in a part of the coal carbonising industry in addition to accomplishing its specific object. If the iron and steel industry were to be nationalised, among other effects it would complete the side-line nationalisation of the coal carbonisation industry to the extent of 90 per cent, and this effect might again pass unnoticed.

There was perhaps no branch of applied science in which the triumph of free enterprise had been more signal than the products of coal carbonisation. Research, and the application of knowledge gained from research, was of considerable importance to an enterprise such as theirs, said Sir Walter, and the original central research organisation, which was established in 1932 to supplement the activities of the individual branches, had been doubled since the war to form what was now known as the research and development department of the company.

The enlarged department had a staff of 150 people, of whom more than one-third were fully qualified scientists or engineers, capable of applying their knowledge to a wide range of problems.

"Unqualified Opposition"

Steel Bill a Threat to Ironfounders

AT the annual convention in London last week of the Joint Iron Council, which represents the Council of Iron Producers and the Council of Ironfoundry Associations, producers and users of foundry pig-iron passed unanimously a resolution recording "unqualified opposition to the policy of the Government, as embodied in the Iron and Steel Bill now before Parliament. The convention appreciates that ironfoundries in general are not included in the third schedule of the Bill, but as it is clear that if the Bill becomes law the production and distribution of all pig-iron will be entirely at the discretion of the new Iron and Steel Corporation, the convention is unanimously of the opinion that the maintenance and development of an efficient and free ironfoundry industry will be impossible under these conditions. The convention authorises its executive to take all legitimate steps to defend and protect private enterprise throughout every section of the industry and in particular to secure the rejection of the Iron and Steel Bill. Further, the executive committee is urged to take every possible step to bring home to all producers in the industry and to all the purchasers of its products the direct and indirect dangers which threaten the industry."

INDIA'S STEEL PLAN

PURSUING the project to establish one or two complete iron and steel plants with a capacity of one million tons a year, the Indian government has sought the advice of Mr. S. L. Bengtson, consulting engineer and managing director of the International Construction Co., Ltd., of London.

Mr. Bengtson, who is now in India with four assistants, will visit Bengal, Bihar, Central Provinces, Orissa, Madras and Mysore and inspect the country's chief iron and steel producing plants. He expects to complete his report by the end of the year.

One of the best known authorities in his business, Mr. Bengtson during the war was appointed adviser to the British Iron and Steel Control for extensions to existing plants for blast furnaces, steel furnaces, gun factories, tank casting plants, steel foundries, and drop forging and heat treatment plants.

Meanwhile, at a press conference in Calcutta, a suggestion has been put forward by Mr. N. N. Rakshit, chairman of the Steel Rolling Mills Association, that a suitable site for the proposed new steel works would be Durgapur, 106 miles from Calcutta on the East Indian Railway.

Industrial Production in Germany

General Improvements in Chemicals and Metals

A GENERAL rise in production during August is shown in the new bizonal index of industrial production given in the *Monthly Report of the Control Commission for Germany (British Element)*, Vol. 3, No. 9, September, 1948. Non-ferrous metals and chemicals were among the items showing the largest increase.

The general and psychological effects are of considerable importance. The new currency has proved itself an efficient medium of exchange, reducing the black market, and the morale of business men and workers has consequently improved.

Among the non-ferrous metals, production of electrolytic copper was only 50 tons short of the target figure, while fire-refined copper and aluminium both rose, and the output of hard and soft lead exceeded the target figure by 2200 tons.

Production in the chemical industries continued to rise during August, though at a slightly slower rate than in the previous month. The output in the bizonal area was 70 per cent of the 1936 level, as compared with 64 per cent in July and 53 per cent in June. Continuing better supplies of materials and higher output by workers contributed to the increase, successive post-war records being established both in July and August.

Important basic chemicals were among those which increased during August, with

the exception of nitrogen and sulphuric acid. Soda ash production rose from 30,700 tons in July to 32,300 tons; chlorine from 9300 tons to 9600 tons; caustic soda from 12,500 tons to 13,800 tons.

The large increase of 3100 tons in calcium carbide production was helped by the unusually high level of hydro-electric power on which it is largely dependent, and a seasonal drop is anticipated.

Paints, varnishes, and lacquers rose from a July output of 8300 metric tons to 9800 metric tons in August. A shortage of high quality paints was caused by the continued lack of linseed and tung oils and natural resins. A rise of about one third of capacity occurred in coal-tar dyes. The position in the American zone is less satisfactory than in the British, the chief retarding factor being shortage of the key raw materials white phosphorus, phosphorus trichloride and sulphur chloride, which previously came from what is now the Soviet zone.

While potash, phosphates and nitrogen fertilisers increased, curtailment of nitrogen fertiliser production, however, began in August and continued in September. The position is viewed with some concern as any loss resulting from deliberately reduced production will have to be made good if the food programme for 1948-49 is to be carried out.

Europe's Rising Fertiliser Capacity

PRODUCTION and consumption of chemical fertilisers have increased steadily in Western Europe since the end of the war and have now surpassed the highest pre-war levels. This is recorded in the latest bulletin issued by the Economic Co-operation Administration's Mission in the U.K.

In the immediate pre-war years, this recalls, the nations now taking part in the recovery effort produced about 750,000 tons of nitrogen fertilisers per year. Production in 1943 is likely to pass the million-ton mark. Next year, these countries expect to produce 1.35 million tons.

The ECA has been exporting large quantities of fertiliser directly to Europe, has financed purchases by ERP countries from one another and is helping to provide equipment to increase Europe's own production.

From April 3—when ERP began—up to and including October 15, the ECA authorised the procurement of more than half a

million long tons of various types of fertiliser, valued at more than \$22.5 million, to several ERP countries. Of this total \$5.5 million worth were for Austria, \$5 million for the Anglo-American zone of Germany, \$4.7 million for France, \$4.2 million for Greece, \$2.9 million for the Netherlands and \$3 million for Belgium.

Italy's increased output of nitrogen and superphosphates has enabled her to export considerable quantities to other European countries.

In France, the Government and ECA officials have agreed that 300 million francs of the counterpart fund accumulated to match ECA grants to France will be used to expand production facilities for nitrate fertilisers. This is part of the French campaign to raise consumption of such fertilisers from the present 170,000 tons a year to the 1952 goal of 350,000 tons annually.

SYNTHETIC OPTICAL CRYSTALS

Wide Adaptability of New Technique

From a Special Correspondent

NEW synthetic crystals developed in the U.S.A. are reported to be an improvement on those produced by natural sources.

The need for large lenses and prisms with better ultra-violet and infra-red properties than could be obtained with a non-crystalline substance like glass, has created a demand for crystals of sodium chloride, potassium bromide, lithium fluoride, and to some extent sodium nitrate.

Limitations Overcome

Synthetic crystals from these molten salts grown in the laboratories of the Harshaw Chemical Company, employing technology made available by research at Harvard University and the Massachusetts Institute of Technology, have largely overcome the optical limitations of natural rock salt, sylvine, fluorite, calcite, etc.

Perfect single crystals up to 35 lb. in weight are produced. The synthetic optical sodium chloride crystal, for instance, is said to be far superior to natural rock salt. The others are new.

The infra-red range up to 25 microns can be effectively covered by using lithium fluoride, sodium chloride and potassium bromide optics—each in turn giving a high dispersion in its effective range.

The production control of high octane motor fuel, synthetic rubber intermediates and related products has been revolutionised by the use of infra-red spectroscopy using the new synthetic optical crystals.

The similarity of lithium fluoride to fluorite (CaF_2) has been the primary stimulus for the development of this material. Since ultra-violet transmission is a function of low molecular weight, it is essential that all heavy metal impurities be removed from the lithium salts before conversion to the fluoride.

Purifying Process

Single crystals of lithium fluoride 30 lb. in weight are grown. The so-called background effect obtained by the use of optics made of natural rock salt is entirely absent when synthetic crystal is used. The superior quality of synthetic sodium chloride is in part brought about by the fact that considerable purification is effected by growing these crystals from molten salt in platinum crucibles under carefully controlled temperatures and gradients.

Although synthetic sodium chloride in large single crystals retains its physical properties, such as solubility in water, for

example, these crystals show a remarkable stability, even when stored for several months under the usual run of changing atmospheric conditions.

The laboratory procedure in growing a new synthetic crystal, larger and purer than that grown by nature is interesting. The procedure in outline is as follows:—

When salt is the raw material, under careful control, molten salt will re-crystallise into one single crystal.

Large single crystals of sodium chloride, potassium bromide and lithium fluoride, weighing up to 35 lb. each are grown in either of the single crucible furnaces or in large multiple crucible furnaces. The growing of these crystals is a continuous process and both the temperature and the mechanical lowering of crystals during growth are under complete control.

The platinum crucibles are loaded with salt and placed in position at the top of the multiple-crucible crystallising furnace.

Melting-out

The crucible with completely grown crystal, now red hot, is transferred to the melting-out furnace and the red hot crystal placed in it.

In the melting-out process the furnace temperature is raised until the crystal is dropped from the crucible. (Similar to the removal of ice cubes from a refrigerator tray.)

The crucible is then removed from the melted-out crystal which remains at the bottom of the furnace. Next, the red hot single crystal is quickly transferred to the annealing furnace and is slowly cooled over a period of one week.

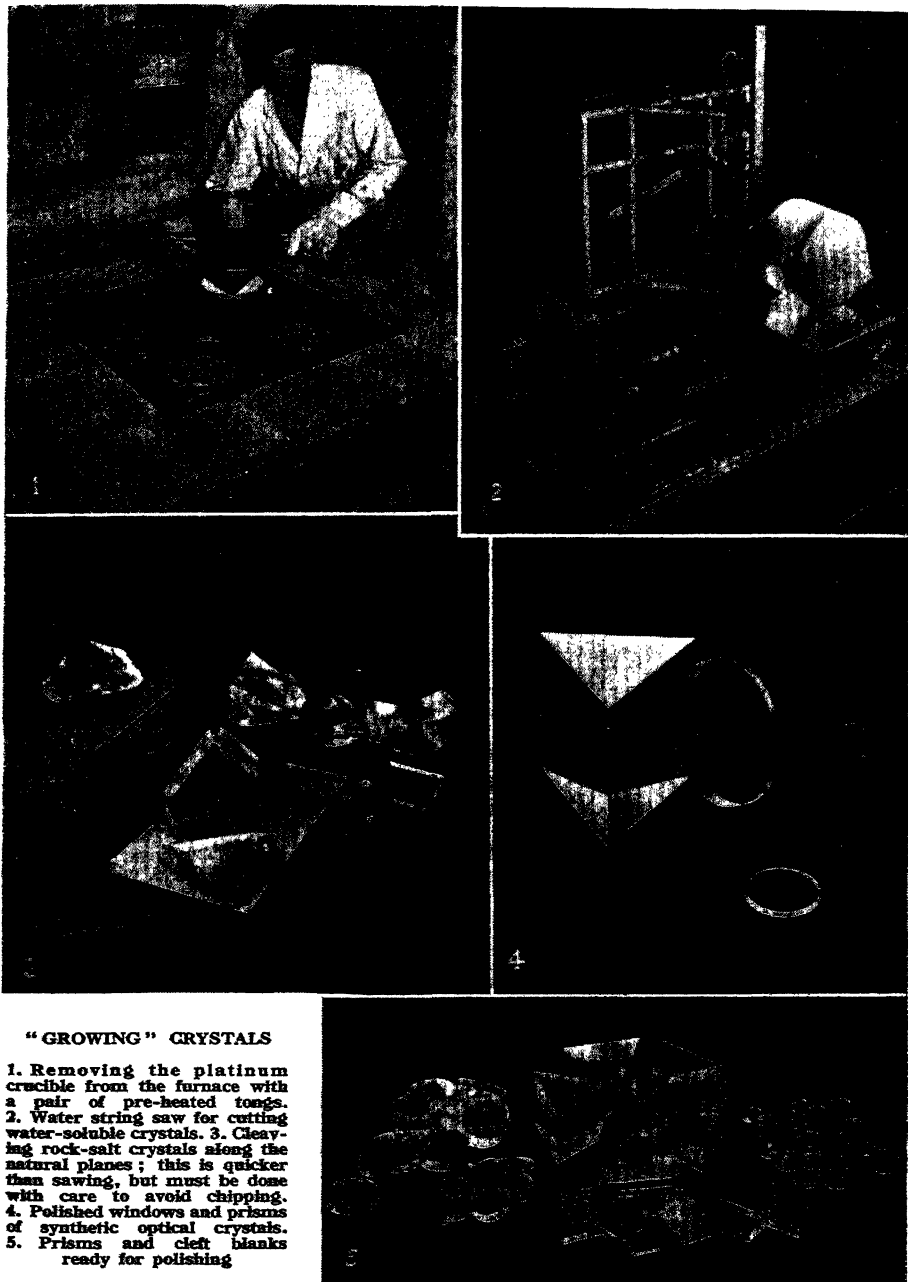
When a used platinum crucible becomes battered and scarred it must be carefully reconditioned. This is done by re-shaping on a steel mandrel, patching if necessary, and re-polishing inside and out.

The reconditioned platinum crucible and cover can scarcely be distinguished from a new one and is now ready for re-loading.

Temperatures in the crucible crystallising furnaces are recorded for close control and record, and are kept within a tolerance of $\frac{1}{2}^\circ\text{C}$.

It can be safely stated that the developments in various fields of applied science that have been made possible by large single crystals of lithium fluoride, potassium bromide and sodium chloride have greatly exceeded the expectation of those who early perceived the usefulness of the new and revolutionary synthetic optical crystals.

Production & Processing of Windows & Prisms



"GROWING" CRYSTALS

1. Removing the platinum crucible from the furnace with a pair of pre-heated tongs.
2. Water string saw for cutting water-soluble crystals.
3. Cleaving rock-salt crystals along the natural planes; this is quicker than sawing, but must be done with care to avoid chipping.
4. Polished windows and prisms of synthetic optical crystals.
5. Prisms and cleft blanks ready for polishing

WOOD PULPING WITH MAGNESIA

U.S. Initiates a Cyclic Recovery Process

From Our New York Correspondent



The steam drum section of the sulphite recovery unit

THE first full-sized pulp mill using magnesium oxide to replace the commoner calcium chemicals in the digesters is about to be put into full production at Longview, Washington, U.S.A. This is the outcome of 10 year's research and experimental work and the production of special equipment in which the Babcock & Wilcox Company, the Howard Smith Paper Mills and the Weyerhaeuser Timber Company have collaborated. This may rank as one of the most interesting departures in the 81-year-old history of the sulphite pulping process in the U.S.A.

The timber company has converted its existing sulphite mill, which used a calcium base cooking liquor and had the usual waste liquor disposal problem, to a cyclic magnesia base sulphite process. In this the disposal problem is eliminated, the chemicals used in cooking the pulp are recovered for re-use, and a large amount of electric power is generated. The advent of a cyclic recovery system in the sulphite pulp process comparable in results with the cyclic recovery systems used in the soda and sulphate processes is expected to have very important implications for the future of this pulp industry and it may be one of the outstanding advances in the paper industry.

Experimental work started in 1937 at a pilot plant at the Ontario mill, of Howard Smith Paper Mills, Ltd. The Weyerhaeuser Company, interested in the possibilities of a magnesium oxide base sulphite acid, constructed and operated a pilot plant at Longview, which was subsequently enlarged to full scale commercial proportions. The Longview plant now extends over 600 acres and embraces a large sawmill, plywood plant, bark-products plant, a sulphite pulp mill and a sulphate pulp mill, all of which are integrated to use all grades and types of logs. The waste liquor recovery system is a further step in complete use of the forest products.

Complementing the recovery of chemicals in the form of magnesium oxide dust and sulphur dioxide gas, is the production of heat and energy which will supply a large part of the power necessary to operate the mill. This double objective is achieved in a cyclic process in which the entire mill effluent is evaporated and burned and the residual dust and gas is transformed into a strong raw acid for re-use in the cooking of the chips, under pressure in digesters. When cooking is completed, the digesters are relieved to atmospheric pressure and the pulp and residual liquor dumped into horizontal tanks.

Conserving SO_2

When separated from the pulp, the residual or waste liquor, with a solid content of from 12 to 14 per cent, is ready for evaporation. Before entering the multiple effect evaporators where it is concentrated to 50 to 55 per cent solids, the sulphite waste liquor is neutralised with recovered magnesium oxide to prevent loss of any sulphur dioxide during evaporation. Further concentration is in cascade evaporators.

The concentrated waste liquor is then burned in a recovery furnace under self-sustaining combustion conditions for the generation of steam in the associated boiler and the removal of the highly reactive ash produced in suspension in the fine gases leaving the boiler. The suspended magnesium oxide ash is collected in a series of cyclonic separators and conveyed to gas absorption towers in the form of a slurry, while the sulphur dioxide passes off in the flue gases. The flue gases are cooled and delivered to gas absorption towers where the slurry of recovered magnesium oxide is fed downwards, counter-current to the rising sulphur dioxide gas, which it absorbs.

The combination of magnesium oxide with sulphur dioxide completes the cycle. The resultant acid is fortified with sulphur burner gas to the extent necessary to compensate for unavoidable losses, and is then returned to the sulphite mill digester building where it is further fortified by the digester relief gases. It is eventually used again in the chip-cooking process and again goes through the cycle of chemical recovery and heat production.

When in operation the Weyerhaeuser magnesium bisulphite pulp mill will dispose of 100 per cent of the waste liquor, which would otherwise go into the Columbia River.

It is expected that pulp of a higher quality than calcium base pulp will be produced with the magnesia base process because the greater solubility of the magnesium compounds will facilitate the pulp-washing operation and result in fewer impurities in the finished pulp.

Recovery and Power Department

The Weyerhaeuser plant has an arrangement which is considered to be unique in the pulp industry. This is a single recovery and power department serving both the sulphite mill and a 200-ton kraft pulp mill, which is also about to be put into operation. Much of the slab wood and wood trimmings, previously used as "hogged" fuel to produce the power for the original sulphite mill, is no longer needed because of the magnesium oxide plant and will be utilised as raw material for the kraft mill.

Babcock & Wilcox recovery furnaces and

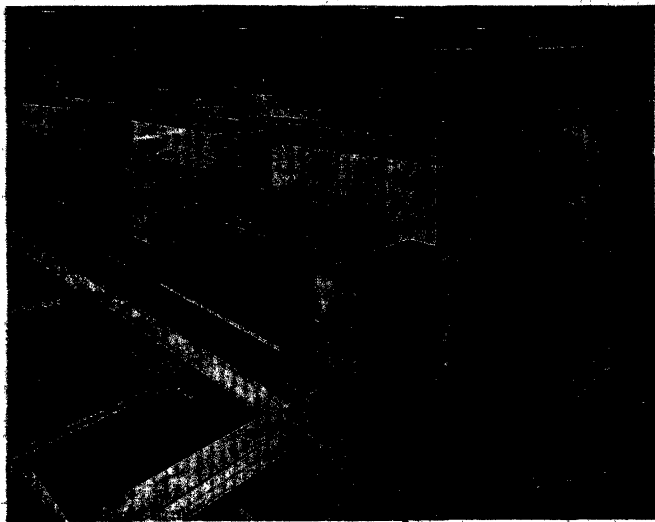
boilers are used for both the magnesium oxide and the kraft mills, and are located in communicating boiler rooms without separating walls. In contrast to the conventional seven-floor kraft boiler room the magnesium oxide side of the building requires only three floors. Both the kraft and the sulphite recovery boilers have the same design pressure of 615 p.s.i. and total steam temperature of 700°F. Each 137-1/2 ton sulphite recovery unit shows a relatively higher steam production with 69,600 lb. of steam per hour as compared with the 220-ton kraft recovery unit with a generating capacity of 101,200 lb. of steam per hour.

This cyclic recovery process will be made available to the pulp industry by licensing under patents by the Babcock & Wilcox Company.

SYNTHETIC FIBRES

THE widening function of synthetic fibres in the chemical industry was discussed by Mr. J. K. W. Berry, addressing the refresher conference on textile science and technology in Glasgow last week. He cited the service given by Vinyon and glass when corrosive chemical action was involved, for Vinyon installed in 1939, he said, was undamaged after nine years' use in contact with acid. Glass had almost equal resistance, although it was less valuable against alkalis. Nylon also showed fairly good alkali resistance. The importance of alginates from seaweed as a readily soluble yarn was mentioned.

A general view of the top floor of the Babcock & Wilcox recovery unit used in the cyclic magnesia base sulphite process at Weyerhaeuser Timber Company, Longview, Washington



Trace Elements in Animal and Plant Nutrition

Successful Government-Sponsored Research in Australia

THE work of a team of industrial and scientific research workers, which, although Government sponsored, is in no way hampered by officialdom, was described by Dr. H. R. Marston, chief of the Division of biochemistry and general nutrition of the Australian Council for Scientific and Industrial Research. This outline was in a lec-



Dr. H. R. Marston

ture on the organisation and work of his division which he gave last week at a special general meeting, in London, of the Royal Society.

Dr. Marston said certain aspects of the organisation of scientific research in the Australian CSIR were, apparently, unique in Government administration. In his division the organisation was there but it was never obtrusive. They were more than a public service department.

Their terms of reference at Adelaide University were "scientific research," and nothing stopped them from getting on with their job, which was primarily the study of the factors controlling wool production in sheep and, more broadly, ruminant nutrition.

Dr. Marston described his division as "a grand experiment in Government administration" which had been brought to successful fruition. A common curiosity kept him and his colleagues together as a team without losing their individuality.

There was no mystery about the factors which controlled the nutrition of ordinary sheep. Study of the role of trace elements in animal and plant nutrition had revealed the limitations caused by deficiencies of such elements as cobalt, copper, zinc and

molybdenum. So there was found a simple and economically feasible way of bringing into useful production many millions of acres of refractory terrain, some of which had hitherto been actually abandoned as useless for agriculture.

Their experiments on some badly undernourished sheep in a certain district had led them to the conclusion that the sheep were suffering from cobalt deficiency and that by the addition of cobalt to the soil the disease could quite easily be cured. A cobalt compound was the crystal which had been discovered for the treatment of pernicious anæmia, and cobalt was the only agency they knew for curing the pernicious anæmia of the ruminant.

Copper Deficiency

Similarly, treatment with doses of copper had cured the deficiency symptoms of sheep on copper-deficient land. This particular nervous complaint of sheep had been known to shepherds in the British Isles for a long time, but until recently its aetiology had been unknown. Copper deficient wool was very heavily depreciated in value.

They had grown oats as an indicator crop for copper-deficient earth. Rye, on the other hand, could derive sufficient nutriment from this calcareous earth. Bad country had been rendered fertile by the addition of copper and superphosphates. In other soils deficient in phosphates it was found that the addition of zinc was needed. Rehabilitation equally vital had resulted from the use of zinc or copper sulphates.

The lecture was illustrated with lantern slides.

NEW SWEDISH PHOSPHATE WORKS

THE Förenade Superfosfattfabriker opened this month at Norrköping a large plant designed to supply agricultural users in Östergötland, Södermanland and partly in North Sweden with phosphate fertiliser. The company's Landskrona works produces annually some 220,000 tons of superphosphate for the southern part of Sweden. The new plant, employing much new technology, is producing sulphuric acid from pyrites, about 35,000 tons from the Boliden Mining Company to convert into superphosphate some 65,000 tons of North African raw phosphate. About 150 people are employed.

Twenty-first Industrial Chemistry Congress

Original Work Reported at International Meeting in Brussels

SINCE the International Congress of Pure and Applied Chemistry was held in London, last year, the most far ranging and representative international gathering of chemists probably was the 21st Congress of Industrial Chemistry in Brussels in September last. Numerically, Great Britain predominated among the foreign delegations, being represented by 34 chemists, two more than Holland's representatives.

The first comparatively full record of the work of the congress has now been presented in a special issue of *Chimie et Industrie* (La Fedn. des Industries Chim. de Belgique, September, 1948) which contains abstracts of all the papers read, comprising seven main groups. These were in sections, covering the main branches of industrial chemistry: (1) Works organisation and research; (2) Fuels; (3) Mining and metallurgy; (4) Construction materials, glass and ceramics; (5) Organic industries; (6) Food and agriculture; (7) General organ-

isation—documentation, research, hygiene, welfare, transport, etc.

Looking through the abstracts, it is noted that Salsas Serra has another paper on combined production of nitric and sulphuric acids, and Guareschi one on the constitution of nitrosulphonic acids for intensive manufacture of sulphuric acid. In the latter connection several patents have been taken out or applied for in this country this year (Guareschi and Maragliano-Busseti).

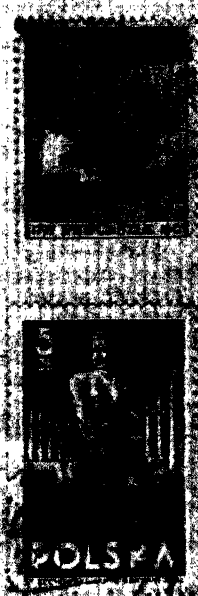
A new method for production of urea was described by Auerbach.

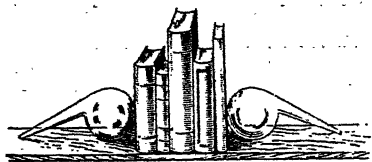
Among many papers on cements were two by Rebuffat. Natta and co-workers, in two papers, dealt with recent Italian work on oxosynthesis. Numerous papers in the plastics section included one on a new reaction for preparing polymerised organosilicic compounds. Subjects of other papers were: use of aluminium in the canning industry (Denmark); non-destructive control of materials; organisation of chemical sales.



Steel Industry in Stamp Design

The importance of steel to-day is acutely recognised throughout the world, and many countries have reflected that recognition in their postage stamps. Examples shown here are (left, top to bottom): Saar 1 f. 50 c. (blue), 1927-32, showing the Burbech steelworks; Rumania 2 lei (red-brown), 1947, depicting the steelworkers' link with chemical industries and agriculture; New Zealand 6d. (orange and brown), 1946 "Peace" set, portraying interior of a steelworks. Right, above and below: Australia 3d. (blue), 1941, commemorating the founding of Newcastle; Poland 5 sloty (red-brown), 1947 industrial series





A CHEMIST'S

BOOKSHELF

The Chemistry of High Polymers and Surface Chemistry. H. W. Melville and E. K. Rideal. Cambridge: W. Heffer & Sons, Ltd. 1948. Pp. 76. 10s.

For several reasons this book requires little introduction. The series of post-graduate lectures which has been organised by the Oil and Colour Chemists' Association since 1941, and which has subsequently, from time to time, been made available in monograph form to a wider public, is well known to all chemists who have sought to keep in touch with current developments. In addition, the names of Prof. Melville, in connection with the chemistry of high polymers, and of Prof. Rideal, in association with surface chemistry, are sufficient assurance that the treatment of the topics will be up to date, informed and readable. The three lectures by Prof. Melville, Synthesis, Molecular Size and Molecular Structure, comprise 46 pages of the total. These were delivered before the association in 1946, and they deal in a fundamental fashion with materials whose technical use has very considerably outstripped the basic understanding of their nature and chemical behaviour. Prof. Melville first discusses the methods which have been used to control polymerisation and the possible mechanisms through which these function. In his second chapter he describes the principal methods which may give reliable indications of molecular size—end-group analysis, osmotic pressure, viscosity and light scattering. He indicates how each of these has its own field of useful application, and discusses the limitations of each method, as well as touching on the experimental difficulties encountered. His third chapter is devoted to the determination of the size of the polymers and the arrangements of the units which constitute them. X-ray methods, measurement of heats of polymerisation, investigation of infra-red spectra have provided much information on the physical side, but purely chemical methods have also been used, and several instances are quoted in some detail to show how valuable they can be.

Prof. Rideal's contribution on surface chemistry first discusses reactions at solid surfaces in a general fashion, referring in some detail, as a particular example, to the

mechanism of the adsorption of hydrogen on metals. The mechanism of catalysis at activated surfaces constitutes the second section of this part of the book, and hydrogen is again used as a specific example, the process of chemisorption and subsequent reaction and desorption in reactions such as the Fischer-Tropsch process being described. A résumé of work on liquid surfaces follows, and the set of lectures is rounded off by a section, Reactions on Monolayers, which was the Liversidge Lecture for 1945. The book as a whole forms an ideal introduction to the two topics of the title, and it is produced as a uniform volume with earlier members of the series. Printing and diagrams are pleasantly clear, and very few typographical errors have been detected.

Applied Chemistry, Vol. II. Foods. C. K. Tinkler and H. Masters. London. 1948. The Technical Press, Ltd. Pp. x+284. 16s.

This volume is sub-titled "A Practical Handbook for Students of Household Science and Public Health," and without this additional description the title might be misleading. The second edition appeared in 1932, and the present volume is stated to be "reprinted with alterations and additions." However, there is nowhere any indication of the scope, nature and number of these changes. The book is primarily intended for students working for the degree of B.Sc. in Household and Social Science, and is concerned with the chemistry of foods and the interpretation of analytical results from the point of view of such a student. Milks, edible oils and fats, carbohydrate foods, raising agents, meat and meat extracts, vinegar, fruit juices and vegetable acids, and beverages are dealt with in turn, and there are chapters dealing with the preservation of foods and poisonous metals in foods, the cooking of food, and the calorific value of foods. The reviewer sees no sign of extensive revision in the light of the considerable advances in food chemistry during the 1930's and even more so during the last war. Thus, two examples at random, to which some attention might surely be devoted in a course of the kind for which this book is intended,

(Continued overleaf)

Technical Publications

CRYSTALLISATION, as an industrial process, owes its importance to the great variety of materials that are, or can be, used in the crystalline form. To separate chemicals from solutions by crystallisation, a supersaturated solution must first be established, and the degree of supersaturation of a system is usually defined as either in the metastable or the labile fields. The Krystal apparatus, invented by A/S. Krystal, of Oslo, Norway, and fabricated by the Power Gas Corporation, Ltd., Stockton-on-Tees, which has the manufacturing rights for Great Britain, the British Empire (excluding the American countries) and some other regions, is described in a booklet just issued. This equipment has been successfully used for the production of crystals of a large number of chemicals, and, it is claimed, is more economical in operation than the more common types of crystalliser. Other advantages claimed are an excellent steam economy and controlled crystal size. The crystals produced can be varied in size in the same unit by simple means from coarse to very fine crystalline material. The crystals are classified to the desired size during the actual crystallisation process without using additional equipment. Screening of the crystals is therefore eliminated.

* * *

So sweeping are the changes in the gas industry which must follow the passing of

A CHEMIST'S BOOKSHELF

(Continued from page 728)

are vitamins and dried egg. The former is practically dismissed with the statement that vitamins are dealt with in another part of the course. No reference to the latter is found.

Within its limits the book is probably useful, although the relative levels of chemistry required of the student seem curiously heterogeneous; detailed instructions are given for calculations on relatively simple titrations on the one hand, while the sections on osazones and dyestuffs seem to require a fairly extensive appreciation of structural organic chemistry. The latest references have not always been included. Britton's *Hydrogen Ions* is referred to in its first (1929) edition, rather than in its third (1942) edition; and indeed there is a noticeable lack of up-to-date references. This book would evidently benefit from further extensive overhaul, not only to remedy the deficiencies quoted but also to provide clarification in detail and to improve the presentation of some of the material.

the Gas Act, 1948, and the establishment of the Gas Council that something in the nature of a plan of the structure now being built up is likely to be needed. Such an outline has now been provided by Mr. J. R. W. Alexander, general manager of the British Gas Council, in "The Structure of the Gas Industry under the Gas Act, 1948." This conveniently summarises the redistribution of responsibility among the new statutory authorities and the numerous provisions which have been laid down for the change-over and the future conduct of industry. This serves as an essential addition to "The Gas Industry—Facts and Figures" which the British Gas Council published in January this year. The Gas Council are also the publishers of the new booklet.

* * *

The current tendency for fairly frequent fluctuations in prices of industrial chemicals lends a special interest to price lists, of which one just received comes from J. W. Towers & Co., Ltd., dealing with the specialised laboratory organic group. These are quoted for 25, 100 and 500 gr. quantities. It is perhaps indicative of present conditions that the company has to preface the booklet with a warning that prices are subject to alteration without notice.

* * *

Published in full in the latest issue of *The Advancement of Science* (Vol. V, No. 19, the British Association, Burlington House, London, W.1, 6s.) are Sir Henry Tizard's presidential address "The Passing World"—to the British Association at Brighton this year and Sir Lawrence Bragg's "Recent Advances in the Study of the Crystalline State" and Prof. John Read's contribution to the Brighton meeting, "Specialisation and Culture in Chemistry."

* * *

"The Pick of the World—Chemicals and Essential Oils—No. 1" is a pocket-sized guide issued by J. Brummer, 14 Seething Lane, London, E.C.3. Eleven different oils are listed, and with each is stated the natural derivation, geographical source, characteristics and applications. The booklet is the forerunner of what is intended to be a series.

* * *

A variety of fare is provided in the November issues of the *I.C.I. Magazine*, both in articles and illustrations, among which the story of the Salt Division and "Hafod's" long association with this country's copper supply are of historical interest.

New Mechanical Mica Splitting Machine

Greatly Increased Rate of Film Production



Mechanical mica splitter developed by U.S. National Bureau of Standards

FOLLOWING a study, begun during the war, of methods of splitting mica, a mineral which has excellent insulating and heat-resisting qualities, scientists at the U.S. National Bureau of Standards have succeeded in producing a mechanical mica splitter in the search to find a more feasible means of producing thin films than the tedious hand method commonly employed.

After bulk methods of delamination by physical or chemical treatment failed to pro-

vide satisfactory results, D. W. Kessler and R. E. Anderson, both of the bureau, concentrated their efforts on developing a mechanical process. The resulting mica splitting machine not only promises to speed up the process considerably but will greatly reduce the period required to train skilled splitters.

Due to common mica imperfections such as unequal spacing of cleavage planes, no precise control of film thickness has been obtained. The quality of the machine-split films, however, compares favourably with that of hand-split film. In tests at the bureau, the rate of splitting obtained with the new device by an untrained operator was 60 films a minute—a rate that would doubtlessly increase with skill in operation. The average rate of hand splitting is between 15 and 20 films per minute.

Like a hand splitter, the machine starts thin sheets by introducing a sharp point into the edge of the mica block. A master valve at the centre of the turntable connects the chuck to the vacuum line to hold the block in position while it is being split; on travelling forward, a carriage moves the chuck a short distance, causing the splitter gauge to raise a film of mica. As the carriage returns to its starting position, two stripper blades pass under the raised film to separate it from the block. The free end of the conveyor draws the loosened film to the belt which carries it to a receptacle. The use of an electromagnet to obtain a rapid vibration of the stripper is contemplated to increase the effectiveness of splitting.

Reviving Use of South African Fluorspar

THE expansion of the steel industry in South Africa has created a new and rapidly increasing market for local supplies of several important minerals, among them fluorspar.

A substantial export trade was built up before the war, but a considerable decline in shipments of fluorspar occurred at the outbreak of war. This setback to producers has been fully counteracted by the expansion of local demand, states *The South African Mining and Engineering Journal*, from which the following particulars are extracted.

Although output rose from 4211 tons in 1946 to 5203 tons last year, the domestic market is capable of absorbing virtually the entire production, exports for the two years mentioned totalling a mere 202 tons and 58 tons respectively.

Between 1923 and 1937 the annual world output of fluorspar rose from 211,701 to 519,000 tons. No recent estimates of world production are available, but the enormous expansion of output which took place during the war years is indicated by an increase in United States shipments from 72,940 tons in 1938 to 368,330 tons in 1943.

The South African deposits of fluorspar are fully described in Bulletin No. 14 of the Union Department of Mines, by L. E. Kent and D. P. van Rooyen. Fluorspar is of widespread occurrence in the Union and has been produced since 1918, when the exploitation of deposits in the Zeerust area first began.

The largest deposit of fluorspar in the Union is situated on Ruigtepoort 1373, Waterberg district, where ancient workings were discovered.

Home News Items

Post Office Guide.—A new edition of the Post Office Guide is now available, price 1s.

Anti-Smoke Campaign.—Liverpool's new smoke abatement officer, Mr. P. H. Saunders, of Birkenhead, who takes over duty next month, will make as his first job the collection material from which a policy to tackle the city's smoke nuisance will be formulated.

Windermere Factory Controversy.—The possibility is held out that the Calgarth factory on the shore of Windermere formerly used for the production of flying boats will be used for the rayon industry. Friends of the Lake District organisation had asked the Government for its demolition.

£70,000 Order for Oil Plant.—£70,000 is stated to be the value of the order for protective coating material for pipelines in the Near East received by Wailes Dove Bitumastic, Ltd., Hebburn-on-Tyne. To produce the material, formerly manufactured only in America, the firm has spent £50,000 on equipment and reorganisation.

Highest Coal Output.—Total production of coal in Britain last week was the highest since December last year, but was still below the weekly average required for the Government's 1948 target. Comparing figures are: Last week, 4,320,800 tons (4,136,600 tons deep-mined, 184,200 tons opencast). Previous week, 4,308,000 tons (4,103,000 tons deep-mined, 205,000 tons opencast).

Procaine Penicillin.—Glaxo Laboratories, Ltd., announces the introduction of Procaine Penicillin G Oily Injection Glaxo, supplied in a 10 cc. vial. This is a sterile suspension in arachis oil containing, in each cc., 300,000 units of penicillin chemically combined with 120 milligrams of procaine. An intramuscular injection of 1 cc. is stated to ensure a therapeutic level of penicillin in the blood for 24 hours.

Another Steel Debate.—A joint statement was issued at Shotton last week by the Flintshire Divisional Labour Party and the Flintshire Conservative Association announcing that steel nationalisation will be debated by Mr. H. T. Edwards, trades union official, and Mr. Geoffrey Summers, director of the Hawarden Bridge steelworks. It will take place at the Alhambra Cinema, Shotton, on Sunday, December 12. The directors of education for Flintshire, Dr. B. Hadn Williams, will preside. There are over 6000 employees at Hawarden Bridge. As the capacity of the cinema is about 1000, admission will be by ticket.

War Memorial.—A memorial plaque in honour of the employees of B.X. Plastics, Ltd., Brantham Works, Essex, who fell in the last war, was unveiled recently by Mr. L. P. B. Merriam and dedicated by the Rev. E. J. Salmon, rector of Brantham.

Sugar Purchases.—Buying permits on form CP.2 for sugar will, according to the Ministry of Food, be valid to the extent of one-and-one-eighth times the quantity stated thereon for the eight weeks beginning October 10, 1948. Para 9(2) of Notice G.2371 is cancelled.

Hydro-Electric Scheme Contracts.—The civil engineering contract for the Errochty section of the Tummel-Garry hydroelectric project, Perthshire, has been awarded to A. M. Carmichael, Edinburgh. The turbo-generators will be built by John Brown, Clydebank.

Gifts to Shotton.—J. Summers & Sons, Ltd., Hawarden Bridge Steel Works, Shotton, has contributed £250 towards the cost of equipping the local recreation ground administered by Shotton Community Council, of which Mr. Geoffrey Summers is chairman. The company also presented the land required.

Dyers' Wages Demand.—No agreement has been reached between the National Union of Dyers, Bleachers and Textile Workers and Allied Association of Bleachers, Dyers, Printers and Finishers on the former's demand for 15 per cent wage increases (10 per cent for piece workers). The matter is to be referred to arbitration. Some 70,000 employees are affected.

Fuel Oil Prices Reduced.—Shell Mex and B.P., Ltd., have announced reductions in fuel oil prices below the maximum prices authorised by the Government on November 1, 1948. A reduction of 8d. per gal. has been made in heavy fuel oil, and a reduction of one farthing per gal. in fuel oil. Prices of gas-diesel oil remain unchanged. Shell-Mex and B.P., Ltd., is the first oil firm to reduce prices.

Edible Gelatine.—The Minister of Food has made the Edible Gelatine Order, 1948, effective from November 22, replacing the Edible Gelatine (Control) Order, 1947. Where formerly use was limited, the new order, with the improvement in the supply position, permits edible gelatine to be used in all types of food manufacture. Licences are still required for the manufacture of food products containing gelatine, also for the prepacking of edible gelatine.

Liver Extracts

Glaxo Products at London Exhibition

AMONG the products shown at the London Medical Exhibition (November 15-19) were two liver extracts, Examen and Plexan, given prominence by Glaxo Laboratories, Ltd., Greenford, Middlesex. It was in the summer of this year that this firm's research scientists succeeded in isolating the anti-pernicious anæmia factor in its pure crystalline form (THE CHEMICAL AGE, June 19).

Progress in Penicillin

Considerable prominence was also given to streptomycin, the manufacture of which by the deep fermentation process is being developed at the company's antibiotic's plant at Barnard Castle, Co. Durham. Later it is hoped to extend manufacturing operations to the new plant under construction at Ulverston, Lancs. The company is now producing sufficient streptomycin to meet the nation's present needs. Heptalgin, claimed to be the ideal analgesic, is another feature on the Glaxo stand. This preparation becomes available on December 1 in 1 c.c. ampoules and 10 mg. tablets in bottles of 25 and 100. The recently introduced diphtheria-portussis combined prophylactic Glaxo vaccines, also exhibited, are representative of the great amount of research and development work of this firm over a number of years.

In his report circulated to the shareholders prior to the 14th annual general meeting, to be held on December 14, the chairman, Sir Harry Jephcott, announces a further increase in the company's export sales, which have now reached more than five times the turnover in 1938. This, he states, has been achieved with but few price increases. It is the belief of the directors that there is still plenty of scope for further increase, but, Sir Harry emphasises, import restrictions in some markets and increasing competition in others will make further advances the more difficult of attainment.

Extensions at Barnard Castle, and the reconstruction of the serious war damage at Greenford, have now been completed. It is hoped that the completed factory at Ulverston, as at present planned, will be in production by April, 1949.

Trading profit for nine months ended June 30 was £1,001,678, compared with £1,191,222 for the previous 12 months. Ordinary dividend, 9s. 4½d. per share, or 92½ per cent for nine months period.

Aluminium Bridge.—Sunderland's new bridge which spans the Hendon and Hudson docks was officially opened last week. Constructed of aluminium, it weighs only 54 tons and spans 90 ft. of water.

Obituary

Mr. R. Murdin Drake

DEEP regret was occasioned by the publication on Tuesday this week of news of the death of MR. REGINALD MURDIN DRAKE, O.B.E., M.Sc., F.R.I.C., joint manager of the Association of British Chemical Manufacturers. His death, two days earlier, followed an operation for appendicitis; he had been ill since November 12. Mr. Drake, who would have celebrated his 46th birthday on December 2, had spent the whole of his adult life with the ABCM, which he joined after acquiring his university qualifications in September, 1926, and to which he had rendered outstanding service. During the war, when Mr. J. Davidson Pratt temporarily relinquished his work for the association to devote himself to the service of the Ministry of Supply, Mr. Drake collaborated with Mr. Allan J. Holden to carry on the greatly widened responsibilities of the association, as joint managers. To this work in the latter years of the war, which was recognised by the award of the O.B.E., he devoted all his days (and many nights) and this ungrudging expenditure of energy undoubtedly seriously affected his health. Since the war he had been the most active instigator of the ABCM's Far Eastern activities, which resulted some years ago in the establishment of the Bombay office, to help establish which he spent some time, with Mrs. Drake, in India in 1946. His phenomenal capacity for organisation was reflected by his able services, simultaneously with his work for the ABCM, as secretary of the Association of Tar Distillers, of the British Barytes Producers' Association and of the former Pharmaceutical and Allied Chemicals Disposals Association. Deep sympathy is extended to Mrs. Drake. The funeral was at Golders Green Crematorium on Thursday.

The death has occurred at Notting Hill, London, W.11, of MR. WILLIAM JOHN WISDOM, for many years a member of the staff of Glaxo Laboratories, Ltd., and latterly personal assistant and confidential statistician to the managing director.

Personal

MR. J. M. BILLANE has been appointed overseas sales manager of the Dunlop Rubber Company.

SIR IAN HEILBRON will preside, and SIR ANDREW McCANCE will propose the toast of "The Profession of Chemistry" at the Ramsay chemical dinner, annual social gathering of the leading Scottish chemical societies, to be held in Glasgow on Friday, December 3.

Overseas News Items

Congo Uranium Ore Plant.—A plant to treat uranium ore is under construction in the extreme south of the Belgian Congo and will be completed by the end of 1950, said a report from Leopoldville last week.

Sulphur Production in U.S.—Production of native sulphur in the U.S.A. during August was 406,220 long tons which was a slight decrease on the previous month, but maintained the high level of over 400,000 long tons for the fourth consecutive month. Total output for the first eight months of 1948 was nearly $3\frac{1}{2}$ million long tons—a record for the industry, according to the report of the Bureau of Mines, United States Department of the Interior.

Germans Free to Export.—Nearly all exports from the British and American Zones of Germany will be made without need of permits from Wednesday next (December 1). Particulars need only be registered with the German Foreign Trade Bank. German exports have been quadrupled since the Joint Export-Import Agency was formed less than two years ago. Now, says the agency, the need for control of a great many commodities no longer exists and the stable currency and banking system permits a return to normal conditions.

Colombian Oil Output.—The Review of the National Bank of Colombia records that the value of petroleum shipments—petroleum represents the country's chief mineral product and its second most import-export commodity—continues to rise in spite of a decline in the volume of production and shipments. Exports in the first half of the current year were valued at \$20.1 million, compared with \$17.7 million in the same period of 1947. If shipments continue on this rate their value should aggregate about \$40 million this year, 8 per cent more than in 1947.

Radioisotopes in Cancer Studies.—The successful use of radioactive iodine to detect thyroid gland cancer has been reported to the U.S. Chapter of the International College of Surgeons. Dr. Luther R. Leader, of Detroit, reported that radio-active iodine had accurately signalled the existence of cancer in 91 per cent of thyroid cases he studied over the past year and a half. Cancer was indicated in 24 cases, 22 of which were later confirmed by pathological reports. He said the isotope tracers located the capercous growth and indicated whether or not it was malignant.

Iron Production Record Claimed.—Czechoslovakian foundries are stated in October to have turned out 149,494 tons of pig-iron—a record for any month since the war.

Plant for Australia.—The possibility of nationalisation has caused the worsted spinning firm of Joseph Smith, Ltd., Checkheaton, to send some of its mill plant to Shepparton, Victoria. Workers are given the opportunity to go to Australia with their machines. Mr. Joseph Smith, who will control the Australian undertaking, is reported as saying: "The working party was the thin edge of the nationalisation wedge."

French Petroleum Developments.—The French Government, to intensify the current search for oil, is to form a holding company with the object of supporting exploration. It embraces, in addition to the Bureau de Recherche du Pétrole (the State research institute for the exploitation of domestic oil deposits), the Compagnie Chérienne des Pétroles and the Société National des Pétroles and its associate in Languedoc. The new company enjoys tax concessions and will probably take up capital to be used for exploratory drillings.

Krypton Gas for Illumination.—It is reported that the comparatively rare Krypton gas is now being used in the U.S.A. to make fluorescent lamps of a new type that are claimed to supply cheaper illumination for home and industrial purposes. Engineers of one of the leading manufacturers of electrical equipment in the U.S.A. report that a 25-watt Krypton tube produces more than five times as much light as an incandescent light bulb of equal wattage. An 85-watt Krypton tube is said to give as much light as a 100-watt conventional fluorescent tube using argon gas.

Coal Production in Argentina.—The first shipments of coal mined in the Argentine State-owned mines of Rio Túrbito have recently been unloaded in Buenos Aires via the South Argentine port of Gallegos. These mines, situated in the south-west near the Chilean frontier were discovered in 1887 but remained undeveloped until 1943. The Rio Túrbito mines and the neighbouring mines of Cancha Carreras are now estimated to contain over 100 million tons of bituminous coal with ash content of 9 to 25 per cent. It is hoped to produce about 60,000 metric tons by 1952 and 300,000 tons by 1957, equal to 10 per cent of annual imports.

Next Week's Events

MONDAY, NOVEMBER 29

The Royal Institute of Chemistry (London and South-Eastern Counties Section). Woolwich Polytechnic, S.E.18, 7.30 p.m. M. S. C. Birbeck: "The Electron Microscope."

TUESDAY, NOVEMBER 30

Institution of the Rubber Industry (London Section). Caxton Hall, London, S.W.1, 7.0 p.m. Mr. T. R. Dawson: "Lignin."

WEDNESDAY, DECEMBER 1

Society of Chemical Industry (Food Group). London: Joint meeting with Society of Public Analysts, Institution of Civil Engineers, Gt. George Street, S.W.1, 7.0 p.m. Discussion on "Food Standards and Labelling." (Plastics Group) Belfast: Royal Belfast Academic Institution, 7.30 p.m. Dr. R. G. R. Bacon: "Some Chemical Aspects of Plastics Manufacture."

Manchester Metallurgical Society. Engineers' Club, Manchester, 6.30 p.m. F. Fancutt: "The Protection of Iron and Steel against Corrosion."

Institute of Welding, Manchester, Reynolds Hall, College of Technology, 7.0 p.m. C. Schofield: "Fabrication of Resistance Welding."

The Chemical Society. Liverpool University, 4.30 p.m. Sir John Lennard-Jones: "Modern Theories of Chemical Valency." Sheffield University, 6.0 p.m. Sir Wallace Akers: "Problems in the Production of Useful Power from Nuclear Energy."

Society of Chemical Industry. Chemical Engineering Group, Bristol. Joint meeting

with Bristol section S.C.I. Dr. Katherine Williams: "The Physiological Effects of the Products of Nuclear Fission."

Chadwick Public Lectures. St. Mary's Hospital Medical School, Norfolk Place, London, W.2. 4.30 p.m. Malcom Morris Memorial Lecture. C. Steeley: "Preventive Medicine and Clinical Medicine in relation to the Public Health."

Institute of Metals. Birmingham: James Watt Memorial Institute, Great Charles Street, 6.30 p.m. B. Coates: "The Treatment and Properties of Springs." Leeds: University, 7.0 p.m. J. Ward: "Recent Developments in Photoelasticity."

FRIDAY, DECEMBER 3

The Chemical Society. Birmingham: University, Edgbaston, 4.30 p.m. Dr. E. A. Moelwyn-Hughes: "The Liquid State." Glasgow: Royal Technical College, 2.15 p.m. G. M. Badger: "The Relative Reactivity of Aromatic Double Bonds"; J. A. Elvidge and F. S. Spring: "Gliotoxin, a Metabolic Product from the Mould *Trichoderma viride*"; J. Taylor and J. Whetstone: "Liquid Eutectics and Low-melting Compositions based on Ammonium Nitrate." Central Hotel: Ramsay chemical dinner. Southampton: Physics Department, University College, 5.0 p.m. Prof. M. G. Evans: Lecture.

Paper Makers' Association. Manchester Engineers' Club, 7.0 p.m. Questions session.

Sir John Cass Technical Institute (Department of Chemistry), Jewry Street, Aldgate, E.C.3, 6.0 p.m. R. V. Riley: "Ferrosilicon Alloys."

Rewards and Duties of Industrial Chemists

AN audience of 116 heard a paper by Dr. Norman Booth on the general subject of "Careers for Chemists," at the recent meeting of the London and South Eastern Counties Section of the Royal Institute of Chemistry, held at the South East Essex Technical College, Dagenham.

Dr. Booth said it was important to give students of chemistry some idea of the type of work which chemists were expected to undertake and the type of posts to which they might aspire. The standard by which professional progress should be judged was not by financial advancement alone; of the other possible criteria, the interest and enjoyment which a man got out of his occupation was perhaps the most important.

For most types of work in which chemists were engaged, ability and knowledge in directions other than pure chemistry were

usually important. The majority of chemists found employment in industry; for example, 61 per cent of the members of the Royal Institute of Chemistry were engaged in industry. There were many types of post in industry, but the principal forms were analytical, research, development work, and production. While a few chemists in industry rose to very high positions and high salaries, there were many who must be content with lesser achievements.

The rôle of chemists as teachers in universities, technical colleges and schools, in Government departments and research associations, as public analysts in consulting practices, and in patent and intelligence work, was also reviewed.

Following Dr. Booth's paper there was a brains trust with Dr. J. G. A. Griffiths serving as question master.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

HOLTS GLASSWORKS CO., LTD., Leeds. (M., 27/11/48.) Oct. 21, debenture, to Lloyds Bank, Ltd., securing all moneys due or to become due to the bank; charged on Vickersdale, Stanningley, Leeds, with fixtures, plant, machinery, etc., and a general charge. *Nil. July 12, 1948.

VERLAX PLASTICS, LTD., Manchester. (M., 27/11/48.) October 22, £500 deb., to Mrs. N. Fryer, Manchester; general charge. *Nil. July 31, 1947.

Satisfactions

JOHN LYSAGHT, LTD., Bristol. (M.S., 27/11/48.) Satisfaction October 19, of trust deed registered August 24, 1929, to the extent of £29,071.

MAYFLOWER METAL & PLATING CO., LTD., Plymouth. (M.S., 27/11/48.) Satisfaction October 13, £700 registered March 18, 1947.

SANT STURGESS, LTD., London, N.W. (M.S., 27/11/48.) Satisfaction October 13, of debenture registered November 25, 1947.

New Companies Registered

Audas & Thomson, Ltd. (460,563). Private company. Capital £100. To acquire the benefit of an invention relating to gas purification, and to enter into an agreement with F. G. Audas and A. E. Thomson. Directors: F. G. Audas, 46 Norton Avenue, Stockton-on-Tees, and A. E. Thomson.

Blynds Hill Laboratories, Ltd. (460,996). Private company. Capital £1000. To acquire the business of manufacturing chemists carried on by Raymond Dewhurst, etc. Directors: Raymond Dewhurst, Ronald Dewhurst, Mrs. A. Lucas and I. Holt. Reg. office: Causeway Mills, Longcauseway, Farnworth, Lanes.

Bolton Chemical Plumbing Co., Ltd. (460,567). Private company. Capital £1000.

To acquire the business of chemical plant engineers carried on by J. L. Parkinson and W. Leyland. Directors: J. L. Parkinson and W. Leyland. Reg. office: Central Street, Bolton.

Brent Chemical Products, Ltd. (460,998). Private company. Capital £500. Manufacturers of chemicals, gases, drugs, fertilisers, glues, paints, etc. Directors: F. Dyson and G. A. Todd. Reg. office: 10/12 Copthall Avenue, E.C.2.

Ilma Manufacturing Co., Ltd. (460,747). Private company. Capital £500. Manufacturers of special chemical formulae to be acquired by the company; distributors of chemical preparations, etc. Subscribers: H. Sawbridge, 40 Ribble Avenue, Southport, and J. Roberts.

Jaketa (London), Ltd. (460,790). Private company. Capital £1000. Manufacturers, importers and exporters of chemicals of all kinds. Directors: F. E. de Wijs and M. Meyer. Reg. office: 36-8 Southampton Street, W.C.2.

Keenok Co., Ltd. (461,013). Private company. Capital £100. Designers, manufacturers and repairers of and dealers in paint making machinery, etc. Registered by Vickers-Armstrongs, Ltd., Vickers House, Broadway, S.W.1.

Lummus Co., Ltd. (460,749). Private company. Capital £5000. Manufacturers of heaters, condensers, distillers, separators, conveyors, etc., for treating petroleum and related materials. Subscribers: F. R. Furber and R. B. J. Richards, both of 18 Austin Friars, E.C.2.

T. & J. McErvell (1948), Ltd. (N.I. 2593). Private company. Capital £35,000. Dealers in artificial manure, fertilisers, etc. Directors: V. Unsworth and M. Hope Johnston. Reg. office: 5 McAuley Street, Belfast.

Moore's Mouldings Co., Ltd. (460,754). Capital £4000. Manufacturers of and dealers in plastic materials of every description. Directors: R. T. B. Moore and J. W. T. Pitts. Reg. office: 820a Green Lanes, Winchmore Hill, N.21.

Rogers-Ray Company, Ltd. (459,875). Private company. Capital £10,000. To participate in the exploitation of the earth's crust; to undertake research work; to manufacture and repair geophysical and other instruments. Directors: S. D. Rogers, R. H. Ray and J. C. Pollard, all of Houston, Texas. Reg. office: 3 Frederick's Place, Old Jewry, E.C.2.

Chemical and Allied Stocks and Shares

THE continued strength of British Funds has dominated stock markets, which remained generally firm and quite active, despite the large volume of investment money which has gone into recent big debenture offers and other new issues.

Chemicals and textiles have been active features in the industrial sections, shares of companies with good prospects in export markets being favoured. With yields on British Funds gradually getting smaller, there is a tendency to favour industrial shares offering reasonable yield, and sound prospects of maintaining dividend rates.

Imperial Chemical at 48s. 6d. have been firm on latest news of expansion plans. Turner & Newall at 80s. were higher on the assumption that the uptrend in the group's profits is continuing while the full report and chairman's statement strengthened Glaxo Laboratories to £18½. Monsanto Chemicals have risen further to 62s. 6d., Albright & Wilson 5s. shares were 30s. 10½d., Amber Chemical 2s. shares 9s. 6d., Fisons 59s., Burt Boulton & Haywood 28s. 9d., and W. J. Bush 83s. 9d. Laporte 5s. units rose to 21s. 9d.

William Blythe 3s. shares have changed hands around 20s. 6d., and elsewhere on the success of the £1,500,000 3 per cent debenture offer at £95 (initial dealings commanded a premium of 15s.). British Aluminium shares moved up to 49s. 3d.

The 4s. units of the Distillers Co. were firm at 29s. 6d., United Molasses were 50s., while British Plaster Board at 23s. 1½d. have improved on the maintained interim dividend. British Oxygen rose further to 104s. 4½d., and Borax Consolidated deferred at 64s. 6d. again moved in favour of holders.

Staveley, after rising to 92s. 3d., eased to 90s. 9d. This is one of the companies scheduled for nationalisation which may be allowed to segregate its assets so that nationalisation may only apply to the steel and kindred sections of the business. Guest Keen at 48s. 9d. were better for a similar reason; but generally iron and steel shares have been easier inclined because of uncertainty as to which companies will eventually be allowed to segregate their non-steel interests.

In other directions, Lever & Unilever firmed up to 52s. 4½d., British Glues & Chemicals 4s. shares showed firmness at 20s. 3d., but De La Rue receded to 36s. 3d. pending the interim dividend announcement. Tube Investments at slightly over £6½ strengthened, in view of the good impres-

sion created by the consolidated accounts. On the other hand, Stewarts & Lloyds at 57s. reflected the rather easier tendency in shares of iron and steel companies scheduled for nationalisation. Tube Investments owns special liaison shares in Stewarts & Lloyds, and moreover Stewarts & Lloyds has similar shares in Tubas. No official news has yet been forthcoming as to how these special shares will be affected by the proposed nationalisation of Stewarts & Lloyds. Tube Investments is not on the nationalisation list.

Boots Drug shares remained more active around 57s. 6d., but elsewhere, Beechams deferred eased further to 17s. 10½d. British Drug Houses 5s. shares were 9s. 3d. Sangers 33s. 3d., and Timothy Whites 39s. 7½d. Oil shares have been more active, but earlier gains were not held. Anglo-Iranian eased on the latest Palestine news, Shells were 77s. 6d., and after a strong rise, V.O.C. reacted sharply to £6 7/16 earlier in the week when there were reports of political trouble in Venezuela.

£6 M. FOR OIL RESEARCH

AT the recent annual meeting of its research experts, the Royal Dutch-Shell group adopted a £6 million research budget for 1949. The programme embraces fundamental research and all phases of research into petroleum, extending from the initial prospecting for crude oil to the use of all kinds of petroleum fuels, lubricants and other final products. The application of petroleum products in agriculture, especially in connection with problems arising in tropical areas, is to receive increasing attention.

About 4000 employees are now engaged on research activities for Shell, whose laboratories in the U.K. (notably at Thornton, Cheshire), the Netherlands and the U.S.A. are among the best equipped in the world. Farms for agricultural research are established at Woodstock, Kent, and Modesto, California.

In 1948, Shell Development Company at Emeryville, California, gained the distinction of receiving the American Institute of Chemical Engineers' "Award for Chemical Engineering Achievement" in recognition of its contribution to the development of the process for the manufacture of synthetic glycerine from petroleum.

One of the most important recent results of the Shell research was the completion at Houston, Texas, by the (U.S.) Shell Chemical Corporation of the world's first full-scale synthetic glycerine plant (THE CHEMICAL AGE, October 30), which will produce 35 million lb. of synthetic glycerine annually.

Prices of British Chemical Products

ACTIVE trading conditions persist in most sections of the industrial chemicals market, with the demand generally continuing on a good scale. In the soda products section a ready market is reported for chlorate, bichromate and yellow prussiate of soda, while any available supplies of soda ash are quickly taken up. There has been no change in the position of the potash chemicals, and in other sections business has remained steady with nothing of outstanding interest to report. Business in the coal-tar products market has again been on a good scale with no particular feature to record.

MANCHESTER.—Few price changes of any consequence have been reported on the Manchester chemical market during the past week, and the undertone generally is steady to firm. Textile bleaching, dyeing and finishing chemicals are meeting with a brisk demand locally and in one or two directions it is not easy to meet requirements. Most other industrial users are fully maintaining the pressure for deliveries under contracts and replacement business during the week

in the alkali and other sections has been fairly active. A fair number of shipping inquiries have also been reported. In the tar products markets crude tar, creosote oil, carbolic acid and the light distillates are going steadily into consumption.

GLASGOW.—There has been little change in the general position in the Scottish chemical market during the past week. Demand has been heavy for white petroleum jelly, and supplies have been very limited. Other grades have, however, been in free supply. Potassium nitrate continues to be scarce, but it is understood that the position is likely to improve early next year. The demand for chemicals in Scotland is steadily increasing as new factories near completion. In the export market conditions are somewhat quieter and are not likely to improve until the beginning of next year.

Price Changes

Rises: Ammonium bicarbonate, sodium acetate.

Reductions: Sulphuric acid, zinc oxide.

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton, £64; 80% pure, 1 ton, £66; commercial glacial 1 ton £79; delivered buyers' premises in returnable barrels: £4 10s. per ton extra if packed and delivered in glass.

Acetic Anhydride.—Ton lots, d/d, 11½d. per lb.

Acetone.—Maximum prices per ton, 1/5 tons, £76 10s.; single drums, £77 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alcohol, Industrial Absolute.—50,000 gal. lots, d/d, 2s. 7½d. per proof gallon; 5000 gal. lots, d/d, 2s. 10½d. per proof gal.

Alum.—Loose lump, £17 per ton, f.o.r. MANCHESTER: £16 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER: £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—MANCHESTER: £48 per ton d/d.

Ammonium Carbonate.—£48 per ton d/d in 5-cwt. casks. MANCHESTER: Powder, £50 d/d.

Ammonium Chloride.—Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £21 to £25 per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate.—MANCHESTER: £5 per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £78 and £76 10s. per ton.

Antimony Oxide.—£162 10s. per ton.

Antimony Sulphide.—Golden, d/d, as to quantity, etc., 4s. to 5s. per lb.

Arsenic.—Per ton, £40 5s. to £41 5s., according to quality, ex store.

Barium Carbonate.—Precip., d/d; 2-ton lots, £25 15s. per ton, bag packing, ex works.

Barium Chloride.—Currently imported at fluctuating rates.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £26 10s. per ton d/d; 2-ton lots, £26 15s. per ton.

Bleaching Powder.—Spot, 35/37%, £11 10s. per ton in casks.

Borax.—Per ton for ton lots, in free 1-cwt. bags, carriage paid: Commercial, granulated, £30; crystals, £31; powdered, £31 10s.; extra fine powder, £32 10s. B.P. crystals, £39; powdered, £39 10s.; extra fine, £40 10s. Borax glass, per ton in free 1-cwt. waterproof paper-lined bags, for home trade only, carriage paid: lump, £77; powdered, £78.

- Boric Acid.**—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granulated, £52; crystals, £53; powdered, £54; extra fine powder, £56. B.P., crystals, £61; powder, £62; extra fine, £64.
- Calcium Bisulphide.**—£6 10s. to £7 10s. per ton f.o.r. London.
- Calcium Chloride.**—70/72% solid, £8 12s. 6d. per ton, in 4 ton lots.
- Charcoal, Lump.**—£25 per ton, ex wharf. Granulated, £30 per ton.
- Chlorine, Liquid.**—£29 per ton, d/d in 16/17-cwt. drums (3-drum lots).
- Chrometan.**—Crystals, 5½d. per lb.
- Chromic Acid.**—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.
- Citric Acid.**—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6½d., other, 1s. 5.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.
- Cobalt Oxide.**—Black, delivered, 6s. 7d. per lb.
- Copper Carbonate.**—MANCHESTER: 1s. 7½d. per lb.
- Copper Chloride.**—(53 per cent), d/d, 1s. 10½d. per lb.
- Copper Oxide.**—Black, powdered, about 1s. 4½d. per lb.
- Copper Nitrate.**—(53 per cent), d/d, 1s. 8½d. per lb.
- Copper Sulphate.**—£42 10s. per ton f.o.b., less 2%, in 2-cwt. bags.
- Cream of Tartar.**—100%, per cwt., from 157s. per 1-2 cwt. lot, d/d.
- Ethyl Acetate.**—10 tons and upwards, d/d, £115 per ton.
- Formaldehyde.**—£31 per ton in casks, according to quantity, d/d. MANCHESTER: £32.
- Formic Acid.**—85%, £64 per ton for ton lots, carriage paid. 90%, £67 5s. per ton.
- Glycerine.**—Chemically pure, double distilled 1260 s.g., 123/1 per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.
- Hexamine.**—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.
- Hydrochloric Acid.**—Spot, 7s. 6d to 8s 9d. per carboy d/d, according to purity, strength and locality.
- Hydrofluoric Acid.**—59/60%, about 1s. to 1s. 2d. per lb.
- Hydrogen Peroxide.**—1s. 0½d. per lb. d/d, carboys extra and returnable.
- Iodine.**—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.
- Iron Sulphate.**—F.o.r. works, £3 15s. to £4 per ton.
- Lactic Acid.**—Pale, tech., £60 per ton; dark tech., £70 per ton ex works; barrels returnable.
- Lead Acetate.**—White, 125s. to 130s. per cwt., according to quantity.
- Lead Carbonate.**—British dry, ton lots, d/d, £116 10s. per ton.
- Lead Nitrate.**—About £125 per ton d/d in casks. MANCHESTER: £125.
- Lead, Red.**—Basic prices per ton: Genuine dry red lead, £127; orange lead, £131. Ground in oil: red, £149 10s., orange, £161 10s. Ready-mixed lead paint: red, £154; orange, £169 10s. (subject to increase of £1 10s. per ton).
- Lead, White.**—Dry English, in 8-cwt. casks, £136 per ton. Ground in oil, English, in 5-cwt. casks, £157 10s. per ton.
- Lime Acetate.**—Brown, ton lots, d/d, £18 to £20 per ton; grey, 80-82 per cent, ton lots, d/d, £22 to £25 per ton.
- Litharge.**—£103 10s. to £106 per ton.
- Lithium Carbonate.**—7s. 9d. per lb. net.
- Magnesite.**—Calcined, in bags, ex works, £18 5s.
- Magnesium Carbonate.**—Light, commercial, d/d, £70 per ton.
- Magnesium Chloride.**—Solid (ex wharf), £27 10s. per ton.
- Magnesium Oxide.**—Light, commercial, d/d, £160 per ton.
- Magnesium Sulphate.**—£12 to £14 per ton.
- Mercuric Chloride.**—Per lb., for 2-cwt. lots, 7s. 6d.; smaller quantities dearer.
- Mercurous Chloride.**—8s. to 9s. per lb., according to quantity.
- Mercury Sulphide, Red.**—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.
- Methanol.**—Pure synthetic, d/d, £28 to £33 per ton.
- Methylated Spirit.**—Industrial 66° O.P. 100 gals., 4s. 10d. per gal.; pyridinised 64° O.P. 100 gal., 4s. 11d. per gal.
- Nickel Sulphate.**—F.o.r. works, 3s. 4d. per lb.
- Nitric Acid.**—£24 to £26 per ton, ex works.
- Oxalic Acid.**—£128 to £133 per ton packed in free 5-cwt. casks.
- Paraffin Wax.**—Nominal.
- Phosphoric Acid.**—Technical (S.G. 1.500). ton lots, carriage paid, £61 per ton; B.P. (S.G. 1.750), ton lots, carriage paid, 1s. 1d. per lb.
- Phosphorus.**—Red, 3s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.
- Potash, Caustic.**—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.
- Potassium Bichromate.**—Crystals and granular, 9½d. per lb.; ground, 10½d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £64 per ton for 1-ton lots, ex store; hydrated, £58 for 1-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Chloride.—Industrial, 96 per cent, 6-ton lots, £16.10 per ton.

Potassium Iodide.—B.P., 8s. 8d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 8½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 8d. per lb.; technical, £7 14s. 3d. to £8 6s. 3d. per cwt., according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—First lump, spot, £49 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £21 to £25 per ton, in casks, ex store.

Salicylic Acid.—MANCHESTER: 1s. 11d. to 3s. 1d. per lb. d/d.

Soda Ash.—58° ex dépôt or d/d, London station, £7 12s. 6d. to £8 7s. 6d. per ton.

Soda, Caustic.—Solid 76/77%; spot, £18 4s. per ton d/d.

Sodium Acetate.—£60-£75 per ton.

Sodium Bicarbonate.—Refined, spot, £11 per ton. in bags.

Sodium Bichromate.—Crystals, cake and powder, 8d. per lb.; anhydrous, 7½d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite.—Powder, 60/62%, £28 7s. 6d. per ton d/d in 2 ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ten lots in 2-cwt. free bags.

Sodium Chlorate.—£45 to £47 per ton.

Sodium Cyanide.—100 per cent basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite.—Pea crystals 22s. 6d. per cwt. (2-ton lots); commercial, 1-ton lots, £16 per ton carriage paid. Packing free.

Sodium Iodide.—B.P., 10s. 2d. per lb. to 12s. 1d. according to quantity.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £103 ton.

Sodium Metasilicate.—£19 5s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98 per cent, 6-ton lots, d/d station, £19 15s. per ton.

Sodium Nitrite.—£28-29 per ton.

Sodium Percarbonate.—12½% available oxygen, £7 per cwt. in 1-cwt. drums.

Sodium Phosphate.—Di-sodium, £32 10s. per ton d/d for ton lots. Tri-sodium, £62 per ton d/d for ton lots.

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Silicofluoride.—Ex store, nominal.

Sodium Sulphate (Glauber Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER: £6 5s. per ton d/d station.

Sodium Sulphide.—Solid, 60/62%, spot. £23 per ton, d/d, in drums; broken, £23 15s. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £14 12s. 6d. to £16 17s. 6d., according to fineness.

Sulphuric Acid.—168° Tw., £6 to £7 per ton; 140° Tw., arsenic free £4 5s. to £5 5s. per ton; 140° Tw., arsenious, £4 15s. per ton. Quotations naked at sellers' works.

Tin Oxide.—1-cwt. lots d/d £25 10s.

Titanium Oxide.—Comm., ton lots, d/d, (56 lb. bags), £97 per ton.

Zinc Oxide.—Maximum prices per ton for 2-ton lots, d/d; white seal, £89 15s.; green seal, £88 15s.; red seal, £87 5s.

Zinc Sulphate.—No quotation.

Rubber Chemicals

Antimony Sulphide.—Golden, 3s. to 4s. per lb. Crimson, 2s. 7½d. to 3s. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £8 3s. 6d. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Bisulphide.—£37 to £41 per ton, according to quality, in free returnable drums.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£56 to £59 per ton, according to quantity.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 10 5/16d. to 1s. 5½d. per lb.; dark, 10½d. to 1s. per lb.

Lithopons.—30%, £33 12s. 6d. per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Eupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermillion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Phosphate.—Not quoted—temporarily unobtainable.

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, in January, £10 5s., rising by 1s. 6d. per ton per month to March, 1948.

Calcium Cyanamide.—Nominal; supplies very scanty.

Concentrated Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. No. 1 grade, where available, £14 18s. 6d.

"Nitro-Chalk."—£10 4s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £17 5s. per ton; granulated, over 98%, £16 per ton.

Coal-Tar Products

Benzol.—Per gal. ex works: 90's, 2s. 6d.; pure, 2s. 8½d.; nitration grade, 2s. 10½d.

Carbolic Acid.—Crystals, 11½d. per lb. Crude, 60's, 3s. 6d. to 4s. 3d. MANCHESTER: Crystals, 10½d. to 1s. 0½d. per lb., d/d; crude, 4s. 3d., naked, at works.

Cresosote.—Home trade, 6½d. to 9½d. per gal., according to quality, f.o.r. maker's works. MANCHESTER: 6½d. to 9½d. per gal.

Cresylic Acid.—Pale, 97%, 3s. 6d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 4d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, 4s. 4d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 10d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 4d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Naphthalene.—Crude, ton lots, in sellers' bags, £8 1s. to £12 13s. per ton according to m.p.; hot-pressed, £14 15s. to £15 14s. per ton, in bulk ex works; purified crystals, £28 to £43 5s. per ton. Controlled prices.

Pitch.—Medium, soft, home trade, 100s. per ton f.o.r. suppliers' works; export trade, £8 5s. to £9 5s. per ton f.o.b. suppliers' port. MANCHESTER: 100s. f.o.r.

Pyridine.—90/140°, 18s. per gal.; 90/160°, 14s. MANCHESTER: 17s. 6d. to 21s. per gal.

Toluol.—Pure, 3s. 2½d. per gal.; 90's, 2s. 4d. per gal. MANCHESTER: Pure, 3s. 2½d. per gal. naked.

Xylol.—For 1000-gal. lots, 8s. 3½d. to 8s. 6d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £15 per ton; grey, £22.

Methyl Acetone.—40/50%, £56 to £60 per ton.

Wood Cresosote.—Unrefined, from 3s. 6d. per gal., according to boiling range.

Wood Naphtha.—Miscible, 4s. 6d. to 5s. 6d. per gal.; solvent, 5s. 6d. to 6s. 6d. per gal.

Wood Tar.—£6 to £10 per ton.

Intermediates and Dyes (Prices Nominal)

m-Cresol 98/100%.—Nominal.

o-Cresol 30/31° C.—Nominal.

p-Cresol 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.

p-Nitraniline.—2s. 5d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—1s. 2d. per lb.; P.G. 1s. 0½d. per lb.

o-Toluidine.—1s. per lb., in 8/10-cwt. drums, drums extra.

p-Toluidine.—2s. 2d. per lb., in casks.

m-Xyldine Acetate.—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—November 24.—The prices of LINSEED, RAPESEED, COCONUT, PALM KERNEL, GROUNDNUT, and WHALE OILS, as well as ACID OILS, are the same as published last month (THE CHEMICAL AGE, October 30). These prices continue for periods ending November 27 in respect of crude oils and December 4 for refined oils. ROSIN and TURPENTINE prices remain the same according to grade.

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Experience and Basic Principles

AT the British Association conference earlier this year, Sir Ewart Smith opened Section A (Physics) with a paper on "Instrumentation and Control." Sir Ewart's comments on the subjects directly indicated by his title are themselves of great importance to every chemist and chemical manufacturer, who is heavily dependent on the physicist for controlling his processes and testing his products. Yet when Sir Ewart came to discuss principles of training, his observations were even more noteworthy. "The universities and technical colleges should aim primarily at training men to understand basic principles, to be critical and to think for themselves," he said. It was more important "that the applied scientist should have the right approach than . . . a vast fund of detailed knowledge."

It would be well for the applied scientist to ask himself if he agrees with this, and in that case, if he applies the idea with its implications. Is it possible that British industry, over large sectors, is more interested in technologists with detailed training or experience than in applied scientists who "understand basic principles"? The demands of industry and the training courses of universities have a reciprocal and mutually-interacting relationship. Consequently, the views of industry cannot but have some influence on the schemes of training, and in turn on the character of the new recruits to the technical and scientific side of industry.

How then does industry fare? Judging

by the "appointments vacant" advertisements, not very well. Emphasis on specialised knowledge or experience heavily outweighs that on mastery of basic principles. In comment, one might well adapt an old saying originally applied to engineering: In production, chemical technology makes developments, science makes revolutions.

For the solution of our present economic difficulties many things are needed. Among them, are not revolutions in production needed, and therefore science in the men in industry? The greatest asset and the export with least material demands on the economy is individual skill. While this comprises much of valuable tradition, must it not now more than ever comprise a larger part of originality and enterprise in approach, method and products?

Also at this year's British Association meeting, the president, Sir Henry Tizard, spoke caustically of manufacturers who "go on doing what they know they can do successfully, rather than to launch out in new directions." His strictures may be deserved only by a few, yet they seem to have the sting of truth in them. For it is certain that, apart from the question of completely new directions, there are many cases where existing knowledge is not applied, where perhaps heat transfer could be improved and frictional resistance to fluid flow reduced—to take some homely examples.

Might industry not gain by the use of the services of inexperienced men, that is,

On Other Pages

Leader :		<i>Industrial Alcohol Freed</i>	748
<i>Experience and Basic Principles</i>	741	<i>Conveyance of CS₂</i>	748
<i>Coal Tar Derivatives</i>	742	<i>Gelatine and Glue Restrictions Eased</i>	748
Notes and Comments :		<i>Depreciation and Maintenance—IV</i>	749
<i>Political Rift</i>	743	<i>Substantial Recovery in France</i> ...	752
<i>Roll of Honour</i>	743	<i>First Continuous Hot Rolling Mill in France</i>	754
<i>Failure of Centralisation</i> ...	743	<i>Standard Sand from DSIR</i>	754
<i>Opinions Invited</i>	744	<i>Gold Production of Tin Plate</i> ...	755
<i>Water Wisdom</i>	744	<i>Porous Metal Uses</i>	756
<i>The British Association</i>	744	<i>Strong Aluminium Alloys</i>	758
<i>A National Science Centre</i> ...	745	<i>German Saltecake and HCl</i>	761
<i>Persecution of Russian Scientists</i>	747	<i>A Chemist's Bookshelf</i>	762
<i>New Lead Combine</i>	748	<i>Technical Publications</i>	763
<i>Leaded Zinc Oxide</i>	748	<i>Next Week's Events</i>	766

of men inexperienced in a particular industry? The outstanding invention, radar, was developed by zoologists working together with radio men; efficiency of military operations was improved by physicists devising and applying the technique of operational research, working together with military men. Is there not a valuable pointer here?

These examples may be rejected as unrepresentative because the scientists concerned were front rank, first class brains, but the objection is not valid. Even the general run of mediocrity of trained scientists can perform some of this valuable cross-fertilising. Ordinary rank-and-file

scientists, despite the defects of present-day educational methods, can surely pose useful questions arising from their basic training and perhaps knowledge gained in another industry.

Is not the way forward along the path of teamwork among experienced men and — possibly inexperienced — applied scientists? Surely for the sake of Britain's future, an overthrow of the cult of "experienced men only" and slavish adherence to precedent is needed. New standards seem to be imminent and new opportunities for the cultured, resourceful, all-round man, who is not averse to thinking along new lines and is capable of provoking similar thought in others.

Coal Tar Derivatives

Further Revised British Standards

THE following revised standard specifications have been issued by the British Standards Institution, undertaken at the request of the Standardisation of Tar Products Test Committee.

BSS 522: 1948 for orthocresol, metacresol and paracresol. The main alteration compared with the last edition of 1938 is that two grades of material are classified according to crystallising point. The specification covers solubility in caustic soda, specific gravity, boiling point, crystallising point, and includes limits for residue on evaporation. (Price 2s. post paid.)

BSS 523: 1948 for phenol. The principal change since the 1938 edition is that a

method for the determination of water has been added to the appendices and the analytical methods have been generally revised. The specification covers solubility in water, crystallising point, boiling point, and includes limits for residue on evaporation and water. (Price 2s. post paid.)

BSS 524: 1948 for refined cresylic acid. The main change compared with the last edition of 1938 is that a clause relating to residue on distillation has been added and the method of test defined. The specification provides for six grades of material: 99.8, 99, 98, 97 and 95 per cent, and covers specific gravity, colour and distillation range. Limits are specified for residue on distillation of water, pyridine bases and neutral oils, acids and alkalis and hydrogen sulphide. (Price 2s. 6d. post paid.)

NOTES AND COMMENTS

Political Rift

THE breach which has been widening continually between nearly all responsible sections of organised science in Great Britain and the U.S.S.R. has been conspicuously reflected since the war by a score of alarming deviations by spokesmen and delegates of Russian research departments from the terms of fellowship which for generations have linked workers in corresponding fields. The numerous laboured attempts to magnify the achievements of Soviet science and to belittle Western organisation, starting as a unique phenomenon, have become tediously familiar and have been consistently ignored by those best entitled to speak if any reply had been merited. Those manifestations of eccentric behaviour have been rightly dismissed as having no scientific interest—except possibly to a psychiatrist. The significant change which has been observable in the past few days seems to represent a reluctant but final recognition that what is at stake is not the popular reputation of this or that scientific school of thought but the freedom of science itself, which much grim accumulating evidence proves to have languished to such an extent wherever the Marxist philosophy holds sway that it must now be regarded as extinct.

Roll of Honour

THE rift now is finally confirmed by the public statements by the president and the past president of the Royal Society in which they have set out in unusually forceful terms their conclusions about the persecution which has been meted out to Soviet scientists whose work has failed to conform obsequiously with "the Party line" of the moment. The letter in which Sir Henry Dale, president from 1940 until 1945, has notified the president of the Academy of Sciences of his resignation of his honorary membership of the academy is at once an accusation and a memorial to distinguished Russians who have paid the penalty of failure to prostitute their intellectual achievements to the political whims of the dynasty. He mentions the cases of Nicholas Ivanovitch Vavilov, first director of the Lenin Academy of Genetics, whose election as one of the 50 foreign

members of the Royal Society in 1942 now appears to have been a posthumous award, subsequent to his "removal" on political grounds, and Academician L. Orbeli, one of the few remaining representatives of the great Pavlov tradition, dismissed and inactive "because he failed to anticipate decrees in their restriction of all research and teachings in genetics in the U.S.S.R. to this politically imposed orthodoxy." Sir Henry Dale's re-creation of what has been happening calls to mind a roll of honour in which the names he mentions can scarcely have been the first and cannot be the last, so long as there remain in Soviet science departments any who seek to preserve the intellectual freedom which the Royal Society and its counterparts around the world have hitherto regarded as inviolable. (*Pages 746 and 747*)

Failure of Centralisation

THE need for further emergency tinkering and improvisation upon the cumbrous machine under which the coal industry labours has come before Parliament this week at a highly inconvenient moment for those who have just been insisting that the nationalisation of iron and steel and all their heterogeneous appendages should be hurried through with as little debate as possible. The first clause in the Coal Industry Bill, to which the second reading was given on Monday, gives authority to inflate the membership of the National Coal Board, without providing any evidence that the "new blood" will be any better qualified to bring realism and experience to the business of coal-getting and distribution and the handling of an uneasy labour force than is the present organisation. Now, after two years' of unfruitful experiment in centralised direction, the industry is yielding little more than is sufficient for essential home needs and the conclusion is unavoidable that the moment when our world-wide markets for coal could have been re-established with ease has already passed. In Belgium, for example, 2,431,000 tons of coal were raised in October last, that is to say as much as in any year before the war; in Poland, output is now reliably reported to be so ample that if that country were

minded to reduce export prices by even a small margin our prospects of resuming our international coal merchant rôle would be even more slender than they are now.

Opinion Invited

THIS is the season of settlements of accounts, and correspondingly a good moment for taking stock, of intangible things as well as goods and chattels. It is to this influence that *THE CHEMICAL AGE* owes the useful comments which a proportion of subscribers include with their orders for renewal of subscriptions, the invoices for which have lately been going out. From the editorial worker's standpoint these glimpses of readers' reactions to the commentary upon the rapidly changing conditions which this paper has sought to provide during the year are always welcome. While it is agreeable to be commended, it is even more stimulating to hear a reader's views of how the editorial formula might be strengthened by the addition or substitution of ingredients. Helpful comments on the other aspect of periodical publication, accountancy and kindred matters, is no less welcome. One subscriber in Akron, Ohio, U.S.A., writes this week "May I congratulate you on your businesslike action in submitting an invoice for a renewal well ahead of the time at which the old subscription expires?" Is that the view of the majority of subscribers? That is the kind of debatable topic about which the reader and subscriber is the only expert witness.

Water Wisdom

IT is customary to deplore the shortsightedness of the industrial pioneers, who conferred on this country a degree of prosperity it had never known before—and unthinkingly transformed fair waterways into noisome drains. The Irwell is one classic example. Something very similar is going on even now and, though its effects are not so conspicuous, it is infinitely more widespread. Industry, no longer highly localised, is continually putting into use new techniques, a good many of which give rise to waste products less noisome than some of the more familiar sources of pollution, but a great deal more toxic and persistent. This represents one of the more obstinate problems with which the Water

Pollution Research Laboratory (DSIR) at Watford, Herts., is dealing, and its importance is reflected in the brief survey of recent work and projects in hand which the laboratory has just issued. This publication bears only the laboratory's name, without the distinction of a subject title, the inclusion of which would have made very much easier its classification in the growing bibliography. Perhaps the fact that it deals briefly and in general terms with almost the entire field of domestic and industrial water pollution and its prevention defeated attempts to give it a specific title. It should, however, achieve its purpose of focusing attention upon the gravity of the problem raised by the fact that water is being used industrially on an ever increasing scale and a great deal of it is being rendered unfit for any further use. Much of the work of the laboratory accordingly is wisely directed to finding ways of enabling industrial effluents to be used more than once, not merely of being rendered fit to discharge into the sewer. Here is a most promising field for the chemist. Saving in water charges is one immediate incentive and, beyond that, the prodigal use of natural supplies and the recurrence of drought conditions make all reasonable economies an obligation.

The British Association

Next Year's Conference

THE annual meeting of the British Association for the Advancement of Science has been arranged to take place at Newcastle-on-Tyne from August 31 to September 7, 1949. It is expected to be one of the largest gatherings in the association's history.

Appointments to the various offices include the following: President, Sir John Russell; general treasurer, Mr. M. G. Bennett; general secretaries, Dr. Edward Hindle, and Sir Richard Southwell. Presidents of sections: Sir Harold Spencer Jones (physics and mathematics); Prof. Sir Alfred Egerton (chemistry); Prof. W. J. Pugh (geology); Prof. A. C. Hardy (zoology); Prof. R. A. Peters (physiology); Prof. N. M. Comber (agriculture). Chairman of the local executive committee, Lord Eustace Percy.

A NATIONAL SCIENCE CENTRE?

Sir R. Robinson's Anniversary Address to the Royal Society



The president (left) and Prof. A. V. Hill, of whom the former says: "He seems to range over all physical science and has even invaded the province of organic chemistry." His great services to physiology arose from his curiosity and ambition to attack some of the most difficult problems in the spheres of biophysics and biochemistry



Amplifying his most comprehensive review of individual and general achievements in many departments of science during the year, the president of the Royal Society, Sir Robert Robinson, in his anniversary address to the society on Tuesday, revealed a number of important changes in the affairs of the society at home and in the relations between British scientists and those who are now in control of scientific affairs in the U.S.S.R.

This, the 236th anniversary meeting, also heard the terms of the greetings which the society sent to T.R.H. the King and Princess Elizabeth on the birth of the Prince, to which the following replies were received:—

"Please convey to the Council and Fellows of the Royal Society the sincere thanks of the Queen and myself for their kind message on the birth of our grandchild. George R."

"We are most grateful for your kind message of congratulations. Elizabeth and Philip."

Seven Awards

The president then announced the award by the society of the following honours and gave a critical appreciation of the contribution to knowledge which each of the recipients had made:—

To Prof. Archibald Vivian Hill, C.H., the Copley medal for his outstanding contributions to the physiology of muscular processes.

To Prof. Franz Eugen Simon, C.B.E., the Rumford medal for his distinguished researches on the properties of matter at low temperatures.

To Prof. Harold Jeffreys, a Royal medal for his fundamental investigations in theoretical geomechanics.

To Prof. James Gray, C.B.E., a Royal medal for his distinguished work on the mechanisation of posture and locomotion in vertebrate and other animals.

To Prof. Edmund Langley Hirst the Davy medal for his distinguished contributions to the chemistry of the carbohydrates.

To Prof. Ronald Aylmer Fisher the Darwin medal for his distinguished contributions to the study of biological evolution.

To Sir Robert Watson-Watt, C.B., the Hughes medal for his pioneer researches in radio-telegraphy.

To Leave Burlington House?

In the course of his review the president said:—

A year ago I mentioned the formation of a committee to study the means whereby adequate accommodation for the scientific societies may be made available. Without being too indiscreet it is possible to provide some further information on a subject of great interest to the Fellows of the society.

In the first place the Scientific Accommodation Committee has so far considered only the long-term problem and it is matter for congratulation that representatives of so many interested parties reached full agreement on this aspect. It was unanimously agreed that the institution of a science centre would provide the best solution. We hope that it will soon be possible to announce a definite outcome, such that a suitable site will be allocated for the eventual creation of a worthy science centre. We have the assurance that favourable con-

sideration will be given by Ministers to transference to a better site, should such be found.

The course of discussion showed that the co-operation of several scientific societies depended on that of the Royal Society and your representatives accepted the flattering implications, though not without some hesitation. To speak directly that means willingness, if necessary in the general interest, to leave Burlington House and to function as the heart of the Science Centre located elsewhere.

The Report of Council mentions the reconstitution of a "Rutherford Memorial Committee" which has various schemes under consideration. At the last meeting of this committee I ventured to suggest that, as one aspect of the memorial, a "Rutherford Hall" of noble design, should form a part of the Science Centre and this was given general approval by the committee and later by Council.

State and the Scientist

I refer to the report that eminent Russian biologists have been constrained to subscribe to interpretations of the data in the field of genetics which they had previously rejected, or perhaps had thought unworthy of serious consideration. According to *Pravda* "The Academy of Science forgot that the most important Principle in Science is the Party Principle." That is a forthright declaration which leaves little scope for ambiguity. The incident is evidently of political rather than of scientific importance, and the Royal Society is not concerned with politics.

We regret that the Academy of Sciences of Moscow has broken off its long correspondence with us. We trust that the new conditions will not seriously impede the advance of biological science for which such qualification as "Western" are as irrelevant as they would be for a multiplication table. We impute no blame and express no opinion as a body, but that does not mean that we must take no cognisance of the occurrence which may have some lessons for us, at least by way of analogy.

For example, we may observe that Governments are not infallible, yet must be obeyed. This reflection should make us more than ever alert to preserve intact the prized freedom of science in our own domain. Actually no direct attack is likely here, and should the unexpected happen it will certainly not be along the lines of compelling us to espouse some particular scientific theory or doctrine. Conceivably it could take the more subtle form of control of the character and direction of our scientific work.

There is immediate danger in the current deprecation of fundamental research, not of

course absolutely, but relatively, in comparison with technological applications. I hope it will be the opinion of all Fellows that the Royal Society should take a leading part in upholding our ideals and in clarifying ideas on these topics and particularly in insisting on the vital rôle which the highest kind of disinterested investigation must play in the life of the community.

It is certainly not sufficiently realised that the body scientific can only flourish when all its organs are in a healthy condition. As in a biological equilibrium there is a natural interdependence between pure and applied research. Pure science is fertilised by the advance of technology and *vice versa*. It would be quite consistent, though lamentable, to take up the position that we will have no more research at all and devote our energies to the exploitation of present knowledge. But is it impossible to dissect the elements of real progress. If we isolate one of the limbs of the organism it will not grow and will soon die.

Government Support

Mr. Herbert Morrison, Lord President of the Council, at the dinner of the Royal Society in London on Tuesday night, proposing the toast of "The Royal Society," said that never had more depended on the capacity and tenacity of scientists to maintain their traditions without compromise. The struggle in which we were engaged to-day for the whole future of western civilization was a struggle to defend a few simple fundamental values without which free men could not live. The spirit of scientific inquiry, the scientific approach to problems of all sorts and the self-discipline and universality of the scientist were among the most essential of those values.

The Government was very sympathetic to the creation of a Science Centre in London which would become a worthy home for what had come to be regarded as the British National Academy of Sciences. "I can make no promises," he said, "but I hope that before long the Government will be able to acquire on your behalf a site on which a science centre can be built."

Early Professor of Chemistry.—Professor William Davidson, first known professor of chemistry in Europe who graduated in 1617, was remembered by Aberdeen on November 26, when Professor Read, of St. Andrew's University, lectured. Davidson worked in Paris as an apothecary, taught chemistry and later became physician to the King of France. He later acted in this capacity to the King of Poland and wrote the first of his important books.

Persecution of Russian Scientists

Sir Henry Dale Resigns from Soviet Academy of Sciences

SIR HENRY DALE, president of the Royal Society 1940-1945, has resigned his honorary membership of the Academy of Sciences of the U.S.S.R.

In a letter to the president of the



Sir Henry Dale

Academy, Sir Henry, who had publicly declared his views of the U.S.S.R. assault on the freedom of science at a meeting of the Atomic Scientists' Association (*THE CHEMICAL AGE*, November 6), quotes the few facts known relating to the mystery of the distinguished Russian scientist N. I. Vavilov.

Declaring that he fears the president of the U.S.S.R. Academy of Sciences and his colleagues must be acting under coercion, Sir Henry offers them his sympathy and concludes his letter: "For my own part, being free to choose, I believe that I should do disservice even to my scientific colleagues in the U.S.S.R. if I were to retain an association in which I might appear to condone the actions by which your academy, under whatever compulsion, is now responsible for such a terrible injury to the freedom and the integrity of science."

Defence Freedom

In his summary of what is known about the fate of the first director of the Lenin Academy of Genetics Sir Henry Dale recalls: "It had been reported in Britain already in 1942, that N. I. Vavilov had somehow fallen from favour with those who came after Lenin, though the cause of his trouble was still unknown; we might have supposed it to be political or otherwise irrelevant to his scientific achievement. Not till 1945 did the Royal Society discover that

he had been dismissed from his position, had disappeared with a number of his co-workers in genetics, and had died at some unknown date between 1941 and 1943.

"Repeated inquiries addressed to your academy by the Royal Society through all available channels asking only the date and the place of his death received no reply of any kind. I understand that the Royal Society has not yet been officially informed whether this distinguished Russian scientist was still alive at the time of his election to its foreign membership.

"More recent events, of which full reports have come to hand, have made it clear what has happened. The late N. I. Vavilov has been replaced by T. D. Lysenko, the advocate of a doctrine of evolution which, in effect, denies all the progress made by research in that field since Lamarck's speculations appeared early in the nineteenth century. . . . This is not the result of an honest and open conflict of scientific opinions; Lysenko's own claims and statements make it clear that his dogma has been established and enforced by the Central Committee of the Communist Party as conforming to the political philosophy of Marx and Lenin."

To Share Technology

Montecatini and American Cyanamid

AN agreement to co-operate by exchanging information and some patent rights relating to dyestuffs, pigments, and a few textile and rubber chemicals, has recently been concluded between the American Cyanamid Company and the Italian Montecatini chemical and mineral combine, which has 103 plants throughout the world. Under the terms of the agreement, full details of which have not yet been made available, each of the parties is free to sell products covered by its patents in any country of the world. No exchange of information about fertilisers and insecticides is proposed.

Confirming reports of the conclusion of the contract, American Cyanamid officials in New York said: "It is expected that information made available under this agreement will be of substantial benefit in the rehabilitation of the Italian chemical industry and give to the United States industry knowledge of the latest technical advances in Italy on the subjects covered by the agreement." The agreement is not confined to past achievements alone, but covers exchange of information on any new developments by either of the parties.

New Lead Combine

Eight Firms Involved

EIGHT companies prominently associated with the lead industry will, from January 1, 1949, no longer use their individual names, but will trade under the single name of Associated Lead Manufacturers, Ltd. They are:—

Cookson Lead & Antimony Co., Ltd.; Locke, Lancaster and W. W. & R. Johnson & Sons, Ltd.; Walkers, Parker & Co., Ltd.; Foster, Blackett & James, Ltd. (lead departments only); the Librex Lead Co., Ltd.; the London Lead Oxide Co., Ltd.; A. T. Becks & Co., Ltd.; the Oidas Metals Co., Ltd.

The A.L.M. was nominally incorporated in 1919, and co-operation between the individual firms is stated to have grown steadily closer since then. The present stage was delayed only by the war. The change will, it is intended, help to streamline the organisation and is part of a general process of reorganisation which is aimed at giving customers the advantages of nationally organised purchasing and distribution and of co-ordinated modernisation of plant, processes and research.

Some of the companies concerned date back to the 18th century; Cookson's were formed in 1704, and the Thames-side works of Locke, Lancaster's opposite Greenwich Hospital have for very many years been well known to all users of the river. Another memento of the long establishment of one of the associated firms is the familiar shot tower on the south bank of the Thames built by Walkers, Parker & Co. in 1830. It is understood that this is the only building which will be preserved on the site of the 1951 Exhibition. A later incident is the industry's contribution to the famous Pluto installation.

Under the new organisation there are three main area offices at London, Newcastle and Chester, the head office also being in London. There are ten factories for the manufacture of lead and lead products, together with antimony and tin and their products and many special alloys. The factories cover an area of 56 acres.

Leaded Zinc Oxide

THE British Standards Institution announces the issuing of a new British Standard (1481: 1948) setting up approved characteristics of leaded zinc oxide.

This specifies that the leaded zinc oxide shall be in the form of a dry, soft powder, consisting of either co-fumed or blended zinc oxide and basic sulphate of lead. It shall be one of three types, except by special agreement, the compositions of which are set out in tabular form.

Industrial Alcohol Freed

BoT Notes Improvement in Supplies

THE Board of Trade announces that an order has been made releasing the following commodities from control from January 1, 1949: methylated spirit, acetone, butyl acetate, ethyl acetate, amyl alcohol, fusel oil and paraformaldehyde.

This order gives formal effect to the decontrolling of one of the groups of commodities which the President of the Board of Trade announced on November 4 were to take place during November and December. The commodities named, with the exception of amyl alcohol and paraformaldehyde have been under statutory control of acquisition, disposal, use and price since September 1939. Amyl alcohol was brought under control (but not of price) in July 1940 and paraformaldehyde similarly in February 1942. The shortage of supplies which has persisted throughout has now ceased, says a BoT statement accompanying the news.

S.I. 1948 No. 2572, The Molasses and Industrial Alcohol (Amendment) (No.2) Order, 1948 (1d.), which relates to the new conditions, is now available from H.M. Stationery Office.

Conveyance of CS₂

New regulations governing the conveyance of carbon bisulphide, which came into operation on November 8, state that "the tank, if of more than 600 gallons capacity, shall be divided into self-contained compartments, no one of which shall contain more than 600 gallons." This relates to the construction of mechanically driven road tank wagons, and is in substitution for a similarly worded paragraph in the regulations of 1935 which provided for 500 gall. in each instance.

Duty Exemption Orders.—Gas mantle ash has been exempted from customs duties by the Treasury under the Safeguarding of Industries (Exemption) (No. 9) Order, 1948, and the Import Duties (Exemptions) (No. 5) Order, 1948. Under the former order, tricyan-triamide is also exempted from Key Industry Duty for a period ending December 31, 1948. The orders came into operation on November 18.

Gelatine and Glue Restrictions Eased.—Restrictions on the acquisition, supply, and use of animal glue, gelatine, and size have been withdrawn. These restrictions were imposed by the Board of Trade under the Glue, Gelatine and Size (No. 3) Order, 1946. Ministry of Food restrictions on certain uses of edible gelatine are withdrawn at the same time. Import and export licences for animal glue, gelatine, and size, and for edible gelatine, are still required.

DEPRECIATION AND MAINTENANCE-IV

Repairs, Renewals and Overhauls of Chemical Plant

by ²S. HOWARD WITHEY, F.Comm.A.

THE annual cost of maintaining units and sections of chemical plant in proper working condition varies considerably, not only as between one period and another but in individual cases according to the nature of the operations to be performed. Much of the equipment at present in use is of a high standard, but some work has to be carried through at such speed that the burden of repairs, renewals, overhauls and adjustments is increasing at a very rapid rate and special efforts are called for to ensure the building up of reserves adequate to meet all contingencies.

Invoices and debiting documents relating to a particular operation or contract may have been properly entered and classified in the user's purchases journal or bought day-book, but unless provision is made for all outstanding charges the figures shown in the final accounts may be very misleading. Proportions of expenses outstanding at the date of stocktaking or balancing should be passed through the books by inserting the amounts as the last entries on the debit side of the respective ledger accounts, with the date and the words "To Reserve," enabling the full and proper charge under each heading to be incorporated in production costs.

Such reserves should be treated as liabilities when drafting the balance sheet and should be shown in the expenses ledger as the opening items on the credit side of the particular nominal accounts to commence the next operating period, with the date and the words "By Reserve," in each case.

Three Years' Average

If the cost of upkeep and maintenance of plant does not exceed the average for the previous three or four years, a reserve may be created to enable the burden to be met without undue strain, and this applies even though the actual maintenance or repair work is not likely to be put in hand for some time. In addition to such provisions, it is often advisable to set aside some portion of the disposable profit to help tide over the many difficulties likely to be encountered before targets are reached, such reserves being made after the book value of the plant has been written down in accordance with a definite scale and after provision has been made to cover all anticipated losses and liabilities.

Sums allocated out of profits for strength-

ening the general financial position of the business, or to enable dividend to be paid or maintained, should be regarded as capitalised profits on the principle that profits which have actually been realised are turned into working capital. There can be no such reserve if the profit and loss account already shows a debit balance—all financial losses must first be wiped out—but some firms possess reserves which are not disclosed on the balance sheet.

Book Value

For example, the value of property has increased during recent years and the book value of the works premises may be considerably lower than the actual value as between a willing buyer and a willing seller, or stocks may have been deflated, or excessive amounts written off during previous periods, so that there is a material difference between a reserve and a reserve fund not always appreciated by directors and executives.

A reserve should be regarded as a proper charge against production operations, and, therefore, against profits, but a reserve fund consists entirely of sums which have been set aside out of profits for the purpose of meeting certain contingencies, the vital distinction being that even though the result may be a financial loss for the period under review it is essential that all reserves should be brought into the account, whereas it is impossible to build up an effective reserve fund except by means of appropriations from profits which have been made. In other words, a reserve fund really constitutes an earmarked portion of the periodical profit-and-loss account.

In some cases provision for contract prices which are likely to prove irrecoverable is made by calculating a certain percentage of the total sum outstanding at the balancing date, but it is better to examine the items individually and to make out a list of all amounts which are either definitely irrecoverable or very doubtful of collection. Such reserves should be shown as deductions from the assets when drafting the balance sheet, and the same applies to provisions made to cover discounts or rebates allowable in respect of settlements with recognised or stipulated periods.

In order to ensure that funds will be available for the acquisition and installation of the most modern units and sections

of chemical plant without inconveniently depleting the amount of available working capital, a sinking fund may be created, and the procedure and principles involved can perhaps best be demonstrated by referring to an actual case.

At the end of December last, the plant employed by a firm of chemicals manufacturers in the Midlands had a balance-sheet value of £30,000 and it was decided to take up an outside investment for the specific purpose of securing the sum of £30,000 in ten years' time for re-equipment. The sum needed each year to produce the required amount was ascertained by referring to a table, of which the following is an extract. This gives the decimal part of £1 required to produce £1 at the end of periods ranging from three to 15 years *after* allowing for compound interest at varying rates.

The rate of interest on the investment was 5 per cent and arrangements were made to pay ten annual premiums, the amount payable each year being ascertained by multiplying the decimal .079505 by 30,000, giving

Sinking Fund Table

Years	3 Per cent.	3½ Per cent.	4 Per cent.	4½ Per cent.	5 Per cent.
3 ...	.323530	.321934	.320349	.318773	.317204
4 ...	.239027	.237251	.235490	.233744	.232012
5 ...	.188355	.186481	.184627	.182792	.180975
6 ...	.154598	.152668	.150762	.148878	.147017
7 ...	.130506	.128544	.126610	.124701	.122820
8 ...	.112458	.110477	.108528	.106609	.104722
9 ...	.098434	.096446	.094493	.092575	.090660
10 ...	.087231	.085241	.083291	.081379	.079505
11 ...	.078077	.076092	.074149	.072248	.070389
12 ...	.070462	.068484	.066522	.064666	.062825
13 ...	.064030	.062062	.060144	.058275	.056456
14 ...	.058526	.056571	.054669	.052820	.051024
15 ...	.053767	.051825	.049941	.048114	.046341

£2385. This figure will be debited to each year's profit-and-loss account and will replace the ordinary debit for depreciation, the plant account remaining unaltered during the period, and a corresponding credit entry will be made each year on the credit side of a sinking fund account to which will be added the annual interest items as shown on the debit side of the investment account. At the end of the period of ten years the investment account will contain the following entries:—

Investment for Plant Replacement

DEBIT					CREDIT				
1948					1948				
Jan.	To Premium	...	...	£ 2,385	Dec.	By Balance carried down	...	...	£ 2,505
Dec.	" 5 per cent Interest	...	...	120					
				<u>£2,505</u>					<u>£2,505</u>
1949					1949				
Jan.	" Balance brought down	...	...	2,505	Dec.	" Balance carried down	...	...	5,133
Jan.	" Premium	...	...	2,385					
Dec.	" 5 per cent Interest	...	...	243					
				<u>£5,133</u>					<u>£5,133</u>
1950					1950				
Jan.	" Balance brought down	...	...	5,133	Dec.	" Balance carried down	...	...	7,893
Jan.	" Premium	...	...	2,385					
Dec.	" 5 per cent Interest	...	...	375					
				<u>£7,893</u>					<u>£7,893</u>
1951					1951				
Jan.	" Balance brought down	...	...	7,893	Dec.	" Balance carried down	...	...	10,791
Jan.	" Premium	...	...	2,385					
Dec.	" 5 per cent Interest	...	...	513					
				<u>£10,791</u>					<u>£10,791</u>
1952					1952				
Jan.	" Balance brought down	...	...	10,791	Dec.	" Balance carried down	...	...	13,836
Jan.	" Premium	...	...	2,385					
Dec.	" 5 per cent Interest	...	...	660					
				<u>£13,836</u>					<u>£13,836</u>
1953					1953				
Jan.	" Balance brought down	...	...	13,836	Dec.	" Balance carried down	...	...	17,081
Jan.	" Premium	...	...	2,385					
Dec.	" 5 per cent Interest	...	...	810					
				<u>£17,081</u>					<u>£17,081</u>
1954					1954				
Jan.	" Balance brought down	...	...	17,081	Dec.	" Balance carried down	...	...	20,388
Jan.	" Premium	...	...	2,385					
Dec.	" 5 per cent Interest	...	...	972					
				<u>£20,388</u>					<u>£20,388</u>

				£
1955	Jan.	Balance brought down	...	20,388
	Jan.	Premium	...	2,385
	Dec.	5 per cent Interest	...	1,140
				<u>£23,913</u>
1956	Jan.	Balance brought down	...	23,913
	Jan.	Premium	...	2,385
	Dec.	5 per cent Interest	...	1,317
				<u>£27,615</u>
1957	Jan.	Balance brought down	...	27,615
	Jan.	Premium	...	2,385
				<u>£30,000</u>

				£
1955	Dec.	Balance carried down	...	23,913
				<u>£23,913</u>
1956	Dec.	Balance carried down	...	27,615
				<u>£27,615</u>

The annual payments will be posted direct to the account from the credit side of the firm's cash book, and will aggregate £23,850, the balance of £6150 representing interest, made up as follows:—

				£
1948	...	...	...	120
1949	...	...	...	243
1950	...	...	...	375
1951	...	...	...	513
1952	...	...	...	660
1953	...	...	...	810
1954	...	...	...	972
1955	...	...	...	1,140
1956	...	...	...	1,317
Interest	...	...	...	<u>£6,150</u>

Upon realisation of the investment the sum of £30,000 will be entered on the debit side of the cash book and posted direct to the credit side of the investment account, which will then be ruled off. The balance of the sinking fund will be transferred to the credit of the plant account, and the invoiced cost price of the new plant will be capitalised in the usual way. At the close of each of the ten years the balance standing to the credit of the sinking fund will appear on the liabilities side of the balance sheet, and the debit balance of the investment account will appear as an asset.

The difference between depreciation and a sinking fund account is brought out when money is borrowed for the purpose of installing additional plant or for extending the business premises. The money may be

raised on mortgage debentures and may be repayable in equal instalments over a number of years, and it would be incorrect to charge only this fixed sum in the accounts.

When output is expanding, the credit side of the periodical trading account will also expand, and it is only fair and proper to debit a correspondingly larger sum against the operations. The liability to debenture holders does not necessarily bear any relation to the year's trading, but when properly computed and suitably adjusted the calculation of depreciation can usually be made to represent an equitable charge against revenue.

In the case of gas undertakings and where the shareholders are entitled to larger maximum dividends *pro rata* as the price of gas is reduced below the standard, reserve funds accounts are built up out of disposable profits for the equalisation of dividends, and only expenditure which has been incurred in equipping the works is capitalised, the cost of repairs and renewals being charged against revenue, although in a few cases when a works is reconstructed a proportion of the cost is capitalised.

If the plant and other assets of a business amount to, say, £50,000 and the various liabilities aggregate £30,000, and it is decided to transfer £10,000 to a reserve fund, the amount standing to the credit of the profit and loss account would be reduced from £20,000 to £10,000 it would be necessary to transfer £20,000 from the reserve fund to eliminate the deficiency, thus:—

BALANCE SHEET (BEFORE TRANSFER TO RESERVE FUND)

LIABILITIES				£	ASSETS				£
Sundry Liabilities (enumerated)	...	...	...	30,000	Sundry Assets (enumerated)	...	...	...	50,000
Profit and Loss	...	...	...	20,000					
				<u>£50,000</u>					<u>£50,000</u>

BALANCE SHEET (AFTER TRANSFER TO RESERVE FUND)

				£					£
Sundry Liabilities	...	...	...	30,000	Sundry Assets	...	...	...	50,000
Reserve Fund	...	...	...	10,000					
Profit and Loss	...	...	...	10,000					
				<u>£50,000</u>					<u>£50,000</u>

(Continued at foot of following page)

Substantial Recovery in France

Production Stimulated by German Chemical Equipment

REVIEWING the use to which France has put her reparations, the French Embassy Information Division in New York reports that equipment delivered as reparations has already contributed substantially to the nation's recovery. Its value as at February 15, 1948, compared with that of French imports of industrial equipment, was as follows in three key industries: Electrical industry, 9 per cent; machine-building industry, 22 per cent; chemical industry, 167 per cent.

If the reparations machinery had not existed, France would, in all probability, have been unable to obtain this essential industrial equipment in Europe; she would have had to purchase it in countries outside Europe and, in consequence, the deficit on her balance of payments and on that of Europe would be proportionally greater.

The material destruction suffered by France during the war and occupation has been valued at 28 billion dollars. Her entire stocks of raw materials were seized by the Germans and she lost 80 per cent of her industrial equipment, so that, at the liberation, she was faced with problems demanding an immediate solution.

In French chemical industry, the reparations furnish not only power installations, but also workshops and production equipment such as vats, pipes and gate-valves, which were very scarce after the war. By December 1, 1947, with transfers of equip-

ment from factories at Hess Lichtenau and Ebenhauser, "Francolor," the officially sponsored chemical and dyestuff group, was able to double the output of tyre vulcanisers in the factory at Villers Saint-Paul in the Oise Department and to increase the production of azo dyes by 15 tons per day, in its factory at Saint-Oissen (Saine-Inferieure).

The synthetic fibre, dyestuff, resin and plastics industries in the Lyons region urgently require supplies of sulphuric acid. Assuming that France possessed the necessary materials, it would take more than two years to build a workshop like that of the Allendorf works which was allocated to the Société Saint-Gobain for its plant at Saint-Fons in the Rhône Department. This workshop, which uses the contact process, will resume production at the end of 1948 and will supply 36,000 tons of concentrated sulphuric acid a year, a quantity equivalent to approximately 10 per cent of France's present production which fluctuates between 300,000 and 350,000 tons.

At the end of the current year, the vanadic acid works of the Norddeutsche Hutte plant allocated to the Société Electro-Metallurgique d'Ugine for its Plombières Saint-Marcel works in the Alps, will go into production. This will increase output by 15 tons of pure vanadium a year, thus enabling France to satisfy her requirements of ferro-canadium for special steels.

PROFIT AND LOSS ACCOUNT

DEBIT						CREDIT
To Transfer to Reserve Fund	£	10,000	By Balance	£	20,000	
„ Balance		10,000				
		<u>£20,000</u>				<u>£20,000</u>
„ Loss		12,000	„ Balance		10,000	
		<u>£12,000</u>	„ Transfer from Reserve Fund		2,000	
						<u>£12,000</u>

RESERVE FUND

DEBIT						
To Transfer to Profit and Loss Account	£	2,000	By Transfer from Profit and Loss Account	£	10,000	
„ Balance carried down		8,000				
		<u>£10,000</u>				<u>£10,000</u>

Although amounts expended in the maintenance of plant are as much a charge against profits as are wages paid to employees, such expenditure often has the effect of increasing the number or value of the productive assets, in which case it

should be capitalised and a proportion or percentage written off each year for depreciation due to wear and tear, corrosion, obsolescence, etc.

(To be continued. Parts I, II and III of this article appeared on August 21, October 2 and November 13).

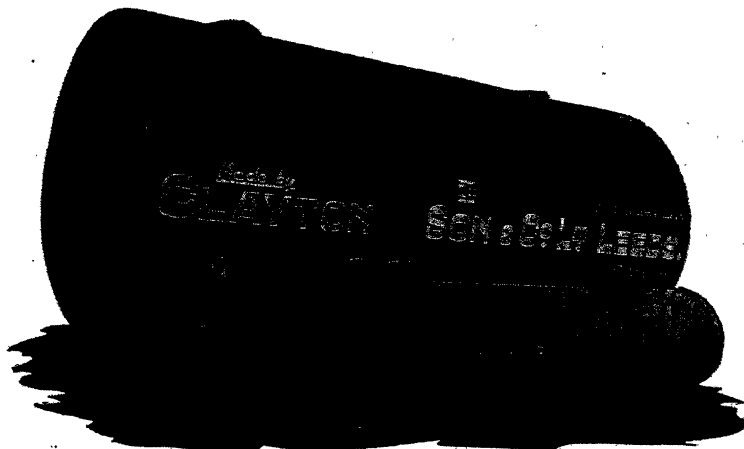
Metallurgical Section

Published the first Saturday in the month

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Metallurgical Section

4 December 1948

RESEARCH ON GAS MIXTURES

Some Substitutes in Continental Steel Making

ALTHOUGH the installation of gas producers for the firing of open-hearth steel furnaces shows no signs of being restricted at the moment, the desire to economise in fuel has aroused greater attention in alternative means of utilising coke-oven and blast-furnace gases.

These have long received close attention by Continental steel makers, with a view to rendering the costly and complicated producer outfit unnecessary, but their practicability depends on the fairly close proximity of blast furnaces and coke ovens—which is not always so common in this country.

The extended temperature of the Martin steel hearth is expected to be not much below 2100°C. and blast-furnace, and even coke-producer gas cannot attain this degree alone. When the blast is heated to 1000°C. with the familiar excess to ensure complete combustion, the theoretical combustion temperature of blast-furnace gas is 1850°C. and coke-producer gas 2000°C. Coal-producer gas, however, attains 2100°C. and coke-oven gas 2300°C. This is in conditions where each fuel gas, except the latter, has been initially heated.

Three tons of coal require to be carbonised to provide enough gas to make one ton of steel, where the coke ovens are heated by their own gas; by heating the ovens with blast-furnace gas, this difficulty may be largely overcome.

Plus Water Vapour

The mixing of the various gases has led to complications in practice, as there appeared to be some dissociation effects; steam injections were accordingly tried out. As a prohibitive quantity of steam was found necessary to be fully effective, gases containing fixed quantities of water vapour were substituted. One mixture successfully used comprised 80 per cent coke-producer gas, and 20 per cent coke-oven gas containing 0.11 oz. of water vapour per cu. ft.

Earlier large-scale experiments with blast-furnace gas enriched with coke-oven gas showed that appreciable losses were suffered due to pre-heating, and that at 932°C. decomposition took place, with some

reduction in hydrogen and methane contents. It was found necessary to adjust the heat values, and vary the proportion of the one gas to the other during the run. The ratio of blast-furnace gas predominated at the beginning, while coke-oven gas was increased towards the end of the melt. For all-round conditions, a mixture capable of giving a calorific value of 7.142 to 7.936 B.Th.U. was considered most satisfactory.

For the making of special alloy steels in the tilting open-hearth furnace, a jet of patented design for mixing the gases was first introduced by A. Schneider. The gas mixture supplied was claimed to give a practically neutral atmosphere over the bath, while a highly basic slag was produced, which, without reducing the carbon content, absorbed all the phosphorus and sulphur.

Direct Use of Coke-Oven Gas

Following this experience, as the matter of calorific value was considered of prime importance, coke-oven gas which had not been treated for the removal of the benzols, etc., was thought to be ideal alone, since as much as from 16.952 to 17.856 B.Th.U. could be obtained. At first it was considered that coke-oven gas required a long hearth to ensure best results, but success was achieved later using the cold gas with different furnace designs.

At the foregoing calorific value, using a 30-ton furnace, the gas consumption worked out at approximately 10.595 cu. ft. per ton of steel produced. The normal removal of benzols, however, reduced the value to 15.872 B.Th.U. when the gas was at its best, and unduly lengthened the time of the heat.

Despite this, the work was extended to 100-ton furnaces, where the gas was led through pipes of 27.5 in. diameter, and then injected into the furnace through water-cooled burners made of wrought iron, and where the pressure was kept at from 10 to 12 in. of water by regulator valves.

A circumstance which is of importance in the manufacture of high-grade steel, is that as coke-oven gas is dry and low in sulphur content, its high proportion of hydrogen can

(Continued overleaf)

create a reducing atmosphere over the bath. The circumstance that the gas burns with an almost invisible flame, and allows a clear view of the contents at all times, holds undeniable advantages, but is not without pitfalls.

This was made very apparent in the initial runs, when the furnace attendants supplied too much gas with disastrous results to the refractories. Other advantages were that the manganese consumed was less than where generator gas was used, and the water-cooled burners enjoyed a long life, and could be readily replaced.

Gas Mixtures

This work with cold coke-oven gas differed in a number of respects from normal operations, and more stringent provisions had to be made to prevent explosions. Despite the advantages, mixtures with blast-furnace gas were again brought into use.

As an alternative to these methods, under the stress of fuel scarcities, a further improvisation was made on the Continent—the substitution of a mixture of blast-furnace gas with gas from brown coal briquettes.

Unlike the earlier experience, the dura-

bility of the furnace was not endangered, and in one instance the roof was found to be in good condition after 412 heats.

No falling-off in production, as compared with the use of pure briquette gas, was encountered; this was accounted for by the fact that the tar from the gas producer played an important part. A large proportion of blast-furnace gas could be employed, because of the enrichment provided by this tar vapour.

It was found necessary to operate the producer slowly and at low temperatures, so as to ensure the maximum development of this tar vapour. For example, in a revolving grate producer of 9½ ft. diameter, only from 7 to 10 charges were worked per 24 hours. The producer had to be worked more slowly as the proportion of blast-furnace gas passed into the open-hearth was increased.

The data which has been published on these subjects make manifest the anxious study of alternatives to which prolonged fuel shortages in some Continental countries gave rise. By such substitutions it has been possible to maintain steel production during periods of great difficulty.

First Continuous Hot Rolling Mill in France

IN order to assist in stepping up economic recovery in France—which is closely allied to the problem of increasing French production of steel plate (now only 75 per cent of the pre-war figure)—it is expected that before the end of 1949 the first continuous hot rolling mill will be in operation in the Denain works at Anzin (Nord).

Using U.S. Equipment

France at present possesses only one continuous rolling mill, a cold one, set up by the Renault Company in 1920 at Hagondange, in Lorraine. A few months ago, two great iron and steel companies, the Société des Forges et Acieries du Nord et de l'Est and the Société des Acieries de Denain-Anzin, while retaining their autonomy in such activities as the exploitation of iron mines, merged their resources in order to utilise two continuous rolling mills, one hot and the other cold, for the production of steel plate. This equipment was purchased in the United States and part of it has already been delivered at Dunkirk.

The continuous hot strip mill will produce 150 tons of steel plate per hour. The second, a continuous cold rolling mill, with an annual capacity of 250,000 tons, will be set up at the Montataire works (Oise), where it will re-roll the blanks produced at

Denain, reducing them from a thickness of 4 mm. to a few tenths of a mm. The total equipment for the hot strip mill, amounting to 35,000 tons, will require several more shipments.

It is unlikely that these giant installations will be in use before the end of 1949, because of the need to set up the milling cutters and build adequate furnaces. Once they go into production, however, they will account for a quantity of steel plate equivalent to total output in 1947, and will make France one of the largest steel plate producers in Europe.

Standard Sand from DSIR

A new batch, the second to be prepared, of standard sand for the determination of the agglutinating value of coal according to British Standard Specification No. 705 is now available. It has been prepared by the Fuel Research Station, Department of Scientific and Industrial Research. The sand will be supplied in 7 lb. tins, costing £1 3s. (post paid in the United Kingdom). Applications should be addressed to: The Director, Fuel Research Station, Blackwall Lane, Greenwich, London, S.E.10.

COLD PRODUCTION OF TIN PLATE

U.S. Methods of Controlling Gauge

TO meet a heavy demand for high grade tin plate and sheet, the Columbia Steel Company, a subsidiary of the U.S. Steel Corporation, has just completed installation of a new modern continuous cold reduction mill at its Pittsburgh (California) plant. Said to be one of the largest and highest speed now in operation, the 56-in. five-stand tandem mill is capable of rolling coils weighing up to 30,000 lb. and can handle hot-rolled, semi-finished material up to 54-in. in width. The finished coils will be 20 in. inside diameter and up to 60 in. outside diameter.

Seven Minutes to Roll

When rolling tinplate stock, the steel will enter stand No. 1 at 0.125 in. to 0.0115 in. thick. For sheets, the entering thickness will be 0.1875 in., and it may be finished at from 0.012 in. to 0.105 in. thick. A coil of 0.008 in. steel 60 in. in diameter would contain approximately five miles of strip and can be rolled in about seven minutes when the mill is operating at its nominal rating of 3900 r.p.m.

The control of the mill is of the adjustable voltage type in which the speed of the motors is governed by controlling the voltage of the generators. However, variations

and refinements of the conventional adjustable voltage control have been made to take care of variable conditions in cold rolling and to provide the necessary stability and speed of response to cope with the transient phenomena which are encountered.

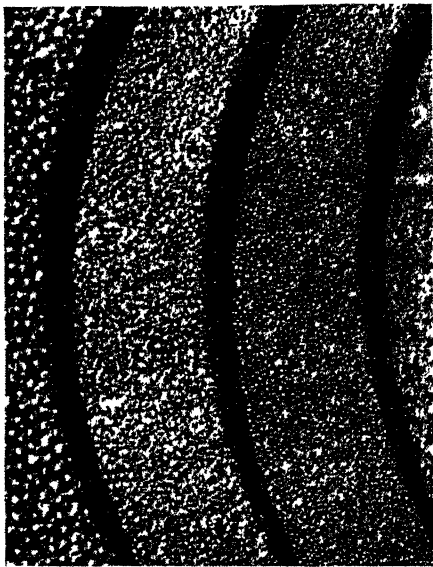
To achieve load balance between the two motors, which are mechanically connected with their armatures in parallel in the case of stands 3, 4, and 5, an amplidyne type load balance exciter is connected in series with the field of each unit. This exciter either bucks or boosts the excitation voltage supplied by the motor field exciter by an amount necessary to maintain an approximately equal division of loads.

The tension reel, like each of the mill stands, operates from its own individual generator. Its control is also of the adjustable voltage type with the voltage controlled in proportion to the speed adjustment of the No. 5 mill stand.

Mill screws and tension on the material are the two chief methods of controlling gauge. Tensiometers, which actually measure the tension of the steel, have been installed between each pair of mill stands. These give a continuous indication of the tension, thereby permitting an operator to make use of tension in controlling gauge without fear of exceeding allowable values.

The five-stand tandem, continuous cold reduction mill, recently installed in the Pittsburgh (California) plant of the Columbia Steel Company, a subsidiary of the U.S. Steel Corporation. First of its kind to be erected on the Pacific Coast, the mill is capable of rolling coils weighing up to 30,000 lb.





Indicating the wide range of gradations in which typical metal powder products are now produced

(Courtesy of Sintered Products, Ltd.)

ALTHOUGH current applications of powder metallurgy are still sufficiently new to give the impression of very rapid development it is questionable whether the rate of industrial application has justified the great prospects which have been apparent for some time.

That certainly appears to be true in the American counterparts of our own metal powder industries, where the extent of the use of iron powder, in particular, has not come up to expectations. The estimated output of iron powder in the U.S.A. this year is only 18,000 tons and the price accordingly remains around 8-12 cents per lb.

Of the newer developments it is thought that the principal two are the production of pre-cast powders and the hot pressing of powders. The latter is said to be still more or less in the experimental stage but already it offers the advantage of working at pressures much lower than hitherto.

Another development may possibly be found in a combination of cold and hot pressing, e.g., for aluminium alloys, as claimed in a recent patent application of the Soc. An. pour l'Industrie de l'Aluminium in Switzerland (Eng. pat. application No. 18835/1947). The subject matter covers light metal bodies and methods of manu-

Porous Metal Uses

* Versatile Powder Products

facture, and endeavours to remove the liability of aluminium alloys to adverse effects from temperatures over 200°C.

The specific weight of these new alloys from powders should not exceed 5 g./c.c., preferably about 3 g., with a tensile strength exceeding 30 kg./mm.² and Brinell hardness of more than 80 kg./mm.² even in the annealed state.

They are prepared by compressing and sintering Al powder, pure or alloyed, of such fineness that at least 50 per cent has particle fineness <2 μ . The powder may be produced by any known method, such as stamp or ball mill. The alloy constituents may be Mg, Cu, and/or Si, and may be incorporated in the known manner.

The method used may be one of the following: (a) cold pressing, sintering, hot pressing; (b) cold pre-pressing, hot pressing, and sintering; (c) hot pressing and sintering. By cold pre-pressing is understood a pressure of 2 tons/cm.². Hot pressing is done above 400°C., preferably 550-600°C., and time will vary according to conditions and kind of product required.

Hot working, such as extrusion at about 450°C., is also said to be beneficial. Control of oxide content is important, for some of the "unexpected" properties obtained are due to oxide films. The products are particularly suitable for use at high temperatures, for i.e. engine pistons and rings, turbine blades, etc.

Bearings, Catalysts and Filters

Another field in which real progress may be claimed is possibly among the oldest in powder metallurgy, namely, in the manufacture of porous products, for bearings, for catalysts of remarkably large surface area—as described in a paper read at the recent Cleveland symposium on surface chemistry by Chas. J. Hardy—and especially for filtering and similar purposes. This latter is of particular interest, and is one in which this country is taking a leading part.

There has long been a need for a porous material of high mechanical strength, ductility, and shock resistance as compared with ceramics, offering good heat and corrosion resistance and permitting fine filtration with low resistance to flow. When, in addition, the material is capable of being welded, soldered and machined it undoubtedly meets many of the varied requirements of the chemical and allied industries for filtration, aeration, distribution, etc. It is

of obvious value wherever the flow or mixing of gases and liquids is involved, as it is also for catalysis, where large surface area per unit volume is required.

Porous bronze bearings, of course, have long been known; but a more recent application of porous metal components is in aircraft de-icing equipment, as developed, e.g., by T.K.S. (Aircraft De-Icing), Ltd.

It is probably in the filtration and allied fields that some of the more interesting developments, present and potential, are to be found; and, while some are still in the experimental stage, numerous important industrial applications have been established for such material as Porosint (Sintered Products, Ltd.).

This is mainly bronze, but research has for some time being occupied with other metals and alloys: copper-nickel, copper-nickel-tin, etc.

The principal shapes for such units available are shown in the accompanying illustrations, one of which also reflects the varying range of porosity obtained. Strictly controlled porosity is, of course, an essential feature; and at present five different grades are produced. They are:—

Grade	Max. particle to pass (in.)	Recommended thickness for filtration (in.)
A	.0001	1/16
B	.0002	1/16
C	.0005	3/32
D	.001	3/32
E	.0015	1/8

The material can be bonded with steel, copper, nickel and their alloys and made integral with the solid metal, thus in many cases simplifying assembly of units. It can also be resistance-welded or soldered, provided precautions are taken to prevent

blinding of pores over too large an area. This surface pore-closing may also occur in machining, which should be used only for registering purposes.

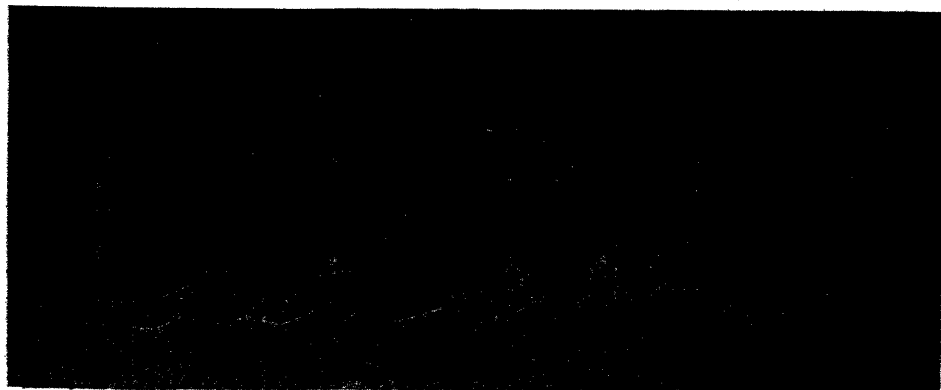
Filters made of this material have now been in regular use for some time for filtration of oil engine fuel, petrol, and paraffin; and have proved particularly suitable where the fuel is injected, since fine filtration is needed to prevent choking of nozzles, and the filter must be robust.

Other Uses

In the mixing of gases and liquids, among many varied uses may be mentioned that of the distributors for fermentation in the manufacture of yeast; and in the production of cresylic acid where copper-nickel-tin distributors, similar to those used in aircraft de-icing, permit much lessened aeration time.

An interesting account of the manufacture of porous metal for these and other purposes, with some of the underlying principles involved, was given by C. E. Sinclair in the powder metallurgy symposium last year (Iron and Steel Inst. Spec. Rep. No. 38). Particular attention must be given to particle size for which the makers have evolved their own special and very effective methods, with which porosity control is intimately connected.

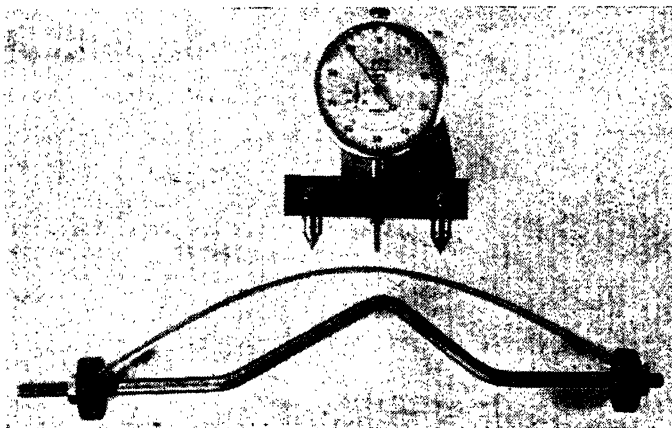
Another important consideration is corrosion resistance. This naturally has formed the subject of numerous tests, some results of which were reported by M. M. Hallett (*J.S.C.I.*, 1948, 67, 57-61, February). Briefly, the conclusions were that corrosion rates with porous bronze are not appreciably different from those of solid bronze of the same composition.



One of the more obvious advantages of the powder metal technique is the ease with which small porous components can be fabricated in quantity

STRONG ALUMINIUM ALLOYS

Scientific Tests of Stress and Corrosion Effects



The dial gauge shown here measures with accuracy of 0.0001 inch the deflection of a specimen of strong aluminium alloy stressed by bowing. When the two outer fixed pins below the dial are placed on the arc formed by the specimen the central movable pin, attached to the plunger of the dial gauge, is displaced proportionately to the curvature of the specimen.

FRESH tests and methods for determining the resistance to corrosion of a number of new high-strength aluminium alloys have been developed by Hugh L. Logan and Harold Hessin, of the U.S. National Bureau of Standards.

Marine Atmosphere Exposure

Stressed samples of these alloys, which are increasingly in demand for use in heavier and faster aircraft, have been submitted to accelerated tests in corrosive solution, and a high degree of correlation was achieved between the results of the laboratory tests and marine atmosphere exposure tests of the same materials under similar conditions.

The Duralumin type 4 aluminium-copper-magnesium alloy, known as 24S-T, was introduced in 1932, and within a decade, had largely replaced other aluminium alloys as sheet material for aircraft construction.

Although its resistance to corrosion was generally acceptable, under some conditions it was appreciably attacked upon exposure to a marine atmosphere or seawater. To increase resistance to this, it has been used in the form of a "clad" alloy, a Duralumin sheeting being integrally bonded to and sandwiched between two thin protective layers of commercially pure aluminium, but this resulted in some sacrifice of tensile strength. This material was found to be adequately resistant to corrosion in service, and has since been used as a standard of comparison in the marine-atmosphere testing of new alloys.

During the war, efforts were made to develop alloys of greater tensile strength

with an adequate corrosion resistance. In the R301-T alloy, this result was sought by covering a Duralumin type alloy with an alloy-cladding layer of higher strength than commercially pure aluminium. In the 75-ST and R303-T alloys, tensile properties were improved by the addition of appreciable amounts of zinc. Use was also made of the discovery that elevated-temperature ageing of the commercial flat 24S-T alloy results in a marked increase in yield strength.

In the bureau's investigation of the stress-corrosion resistance of these new materials, standard ASTM flat tensile specimens with $\frac{1}{4}$ in. reduced sections were tested in the laboratory and in a marine atmosphere under a stress equal to three-fourths of the yield strength.

Corrosive Conditions

In the laboratory, stressed samples of all alloys were continuously immersed in a sodium chloride-hydrogen peroxide solution (NaCl, 57g; 30 per cent H_2O_2 , 10 ml; H_2O , 990 ml.); those containing zinc as an alloying element (R303-T and 75-ST) were also exposed in a boiling 6 per cent solution of sodium chloride. Unstressed specimens were subjected to the same corrosive conditions in order that the effect of stress in increasing corrosion damage could be evaluated. All clad materials were tested with the cladding intact, since the purpose of the tests was to determine the resistance of the commercial alloy as actually used rather than that of the core material itself. Losses in ultimate tensile strength and per cent elongation were taken as criteria of corrosion damage.

Specimens supported vertically and stressed by means of weighted levers were tested in the sodium chloride-hydrogen peroxide solution. Samples up to 0.064 in. thick were kept in the solution for 24 hours. One-eighth inch specimens were immersed for 72 hours, the solution being renewed each 24 hours. Breaking of a specimen under stress automatically opened a knife switch in the circuit of a solenoid counter actuated once every six minutes by a clock.

After removal from the solution and cleaning, the specimens were broken in a hydraulic-type tensile testing machine to determine the tensile properties of the corroded material. Metallographic examinations were also made to determine the types of corrosion that had developed. For marine-atmosphere exposure tests, the specimens were supported and stressed in a similar fashion but were left exposed to the atmosphere.

Stressing by Bowing

Specimens immersed in boiling sodium solution were stressed by bowing, accomplished by a device consisting of a threaded Monel rod, and insulating slotted washers. The specimens were then placed in wide-mouthed flasks connected to reflux condensers and containing the sodium chloride solution. They remained in the boiling solution for 14 days unless earlier failures occurred. At the end of this time the specimens were removed, cleaned, and broken in tensile tests.

The results of the investigation indicate that flat, bare 24S-T aluminium alloy sheet aged four hours or longer at 375°F. is not

susceptible to stress-corrosion cracking in either the laboratory or marine-atmosphere tests, and is at least as resistant to the combined action of stress and corrosion as the commercially heat-treated but unaged material.

Yield Strength

It was found, the bureau reports, that ageing of a sample of this alloy for three hours at 385°F. produced an increase in yield strength of about 25 per cent above an initial value of approximately 50,000 lb. p.s.i., an increase in tensile strength of about 3 per cent above an initial value of approximately 70,000 lb. p.s.i., and a decrease of about two-thirds in the initial elongation of 17 to 18 per cent. Similar results were obtained when the material was aged for 20 hours at 350°F., five hours at 375°F., or one and one-half hours at 400°F.

The samples of the other alloys that were tested, with the exception of R301-T, were found adequately resistant to stress-corrosion cracking. The failure of the R301-T samples was the result of the penetration of stress-corrosion into the core material at the machined edges of the relatively narrow ($\frac{1}{4}$ in. wide) specimens that were tested. Such damage, the bureau concluded, would probably not be significant in wide sheets, particularly those cut by shearing.

In general, it was apparent that the short-time laboratory tests developed by the National Bureau of Standards give a good indication of the corrosion resistance to be expected of the unclad alloys in a marine atmosphere.



The stress-corrosion resistance of aluminium alloy sheet containing an appreciable amount of zinc is determined by continuous immersion in a boiling six per cent sodium chloride solution. Specimens, stressed by bowing, are shown in wide-mouthed flasks connected to reflux condensers and containing the corrosive solution

Oxygen in Iron and Steel Production

Means of Increasing Output and Reducing Costs

OXYGEN already has well recognised functions in the iron and steel industry as a versatile tool for cutting, shaping, and fabricating steel. In the production of liquid steel and of pig iron, it is less well known, and the possibilities are not as yet so fully explored. This new field, however, seems to deserve the closest attention from the steel maker since it offers prospects of increasing output, improving quality, and reducing costs.

In *Oxygen, Its Potentialities in Iron and Steel Production*, the British Oxygen Co., Ltd., shows a number of interesting results of collaboration with the steel industry through the British Iron and Steel Research Association in a programme of co operative experiments.

Furnace Uses

The use of oxygen is explored in the open hearth furnace, in the Bessemer and Tropenas converters, in the electric furnace and in a number of full-scale trials at chosen works.

In both blast and open hearth furnaces, it is pointed out, gas from the furnace which is used in stoves or regenerators for pre-heating could be released to provide energy for the production of oxygen.

Thermal economies in all iron and steel making equipment which burns purchased fuel to generate heat can be effected by the use of oxygen; the advantage becomes greater with higher temperatures, since regenerators become progressively less efficient as the temperature rises. Saving in fuel, or alternatively a reduction in capital cost of the heat exchange equipment, are made possible.

In open hearth steel making the objection to the use of oxygen in the main air stream is that air leakage into the furnace is so high that a considerable quantity of oxygen would be required to have any appreciable effect, and there is a risk of noticeable loss of the oxygen added.

With the present type of furnaces direct improvement in thermal efficiency by the addition of oxygen is not a practicable proposition, but with this object in mind it seems that furnace designs might in future be modified to provide a real saving.

Oxygen has been used to shorten the melting down period by directing oxygen through jets installed in the furnace roof or to pre-heated scrap, so as to cut it down in front of the main burner and make room for the flame. In this way more fuel can be burnt

and time saved when the scrap is being melted.

The importance of regenerators decreases when oxygen is employed, and it therefore seems feasible that in special cases they might be dispensed with altogether. This might be appropriate when the fuel is powdered coal, which has been difficult to utilise in steel melting owing to its rapid clogging action on the checker brickwork of the regenerators by the fine ash or dust.

In Bessemer converters, it is stated that quality is improved by the use of oxygen to lower the nitrogen absorption.

The rôles of high purity, medium purity, liquid and gaseous oxygen and "tonnage oxygen" are compared and the costs of medium purity oxygen set out.

Prior to 1902, commercial oxygen was produced by a chemical method, involving the heating of barium peroxide and regeneration in a current of air. Some oxygen was, and is, made as a by-product in plants producing electrolytic hydrogen, but this method is said to be uneconomical when oxygen is the main product. The selective absorption of air in water has been suggested, but the best method is by rectification of liquid air. A series of diagrams illustrate five different processes.

The whole volume is well produced, with clear print on good quality paper, and there is a comprehensive bibliography.

£10,000 for Tropical Medicine.—The Liverpool School of Tropical Medicine has recently celebrated the 50th anniversary of the school's foundation, and to mark the event a "birthday present" of £10,000 has been given by the directors of the Liverpool firm of African shippers, John Holt & Co. (Liverpool), Ltd., to be used for work in the Department of Tropical Medicine under Professor B. G. Maegraith.

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GERMAN SALTCAKE AND HCl

Technical Descriptions of Typical Equipment

BIOS Final Report No. 1789 gives details of saltcake and HCl manufacture in the Mannheim district and Grevenbrück, by Th. Goldschmidt A.G., Kalichemie A.G., and Ges. f. Chem. Ind. Illustrative documents can be inspected at the Technical Information and Documents Units, German Division, 40 Cadogan Square, London, S.W.1, quoting ref. Nos. BIOS/Docs/3290/2968/1/1-12 for Goldschmidt plant and do. do./2/1-10 for Ges. f. Chem. Ind.

The Goldschmidt equipment comprises two Vetterlein-Zieren, one Lurgi furnace and an HCl absorption plant. The former, originally with seven hearths, now have four. One furnace is direct-heated by producer gas and the other by waste heat from a rotary calciner.

The Vetterlein type plant consists of a brick cylinder reinforced by steel bands, with hollow shaft, air-cooled and of sufficient diameter to permit of a man entering. This is stepped in a cast iron heel step and rotated by bevel and pinion at about 0.5 r.p.m., being retained in position at top by a guide ring in the roof. Rabble arms are fixed (from inside) and carry rabbles in the form of sleeves which are easily renewable.

The raw materials are rock salt and sulphuric acid from the firm's own contact plant of 95 per cent strength. The salt is delivered by elevator into hopper at the top, whence it passes into a worm feed and is mixed with acid to form slurry which, by the rabbles, is reduced to a fairly thin even layer without caking. It is thus fed down through the hearths counter current to the rising heating gases. It then passes out into a steel worm conveyor working in a mild steel tunnel. HCl gas and other products of combustion pass through a pipe to the absorption plant.

Third Vetterlein Plant

It is hoped to install a third Vetterlein plant with output of 14-15 tons sodium sulphate per day, as compared with 11-12 tons of existing furnaces. The saltcake contains 0.6-0.7 per cent NaCl and about 1.5 per cent free H_2SO_4 . The fuel for one of the producer gas heated furnaces is 10 kg. coke per 100 kg. saltcake and the exit temperature of gas is $320^{\circ}C$.

The other furnace is of the well known Lurgi-Leverkusen type on the Mannheim principle, i.e., single-hearth muffle type, with mechanical feed and stirrer. This was not working at the time of the visit. Some

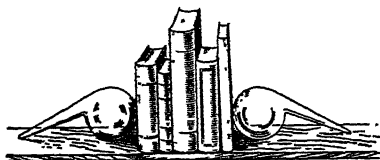
minor modifications have been made by Goldschmidt, including an asbestos rope covering for rabble arms, rabbles, and central shaft, and improved feeding similar to that of the Vetterleins. The output is about 10 tons/24 hours. Heating is by producer gas but requires 20-25 kilos fuel/100 kilos saltcake. HCl concentration is somewhat higher than with the Vetterlein furnaces.

HCl Absorption

The HCl absorption system is a modified Zieren plant in which a small percentage of output has a fairly high H_2SO_4 content so that the bulk of the HCl is as free as possible from H_2SO_4 . The plant is in two sections: first, two towers in series and two filters in parallel, working under suction, second, two absorption towers in series and a washing tower under pressure.

The equipment of Kalichemie A.G. included five Mannheim type furnaces built by Kalichemie, very similar to Lurgi. The working parts were covered with asbestos soaked in sodium silicate, together with powdered glass. The output is 9-10 tons per day of saltcake, and 14-15 tons of 30-32 per cent HCl; the fuel used is 1.7 tons a day. Between the furnace and absorption plant a pre-cleanser was installed into which water was sprayed at the rate of 8-10 litres per hour. At the time of the visit the plant was not working, and the absorption side had been badly damaged.

The plant of Ges. f. Chem. Ind. at Grevenbrück is much smaller, with an output of 250 tons of saltcake per month, together with 430 tons of 30 per cent HCl. The equipment includes one hand-operated Zahn plant on the pot and muffle principle heated by gas producer, and an HCl plant also by Zahn (Berlin). The life of the pots was stated to range from three to nine months. Normally two men per shift can run the plant, but it was not working at the time of the visit owing to the difficulty of getting suitable labour. Here, too, a small pre-cleanser or cooler is installed between furnace and HCl unit. This latter consisted of 45 tourils in three rows followed by two washing towers in parallel over which HCl of 7-15 per cent strength flows but is not circulated. The towers were 8-9 m. high with cross section area of $1m^2$, and were packed with Raschig rings. Owing to the presence of As in the Meggenier pyrites used for H_2SO_4 production, treatment of the HCl with H_2S was necessary for its removal.



A CHEMIST'S

BOOKSHELF

Chemical Calculations: J. S. Long and H. V. Anderson. McGraw-Hill Book Company, Inc., New York. 1948. 5th Ed. Pp. xiii + 401. \$3.75.

Most of us would agree on the necessity for grounding chemists thoroughly in the methods of chemical calculation. Equally, most of us would admit that far too many students, ourselves perhaps included, have not received this necessary attention. The present edition of a well-known text-book—one of the admirable International Chemical Series—provides a very useful and comprehensive discussion of the elementary methods of chemical calculation, together with a wide variety of problems based on the discussion. Starting right at the beginning, with the units of mass, volume and temperature, the book takes the reader through all the usual elementary work on equations, equivalents, volumetric work and so forth, to the level of simple electrochemical problems, the law of mass action, and solubility product. It is approximately appropriate, in other words, to the standard required by the Intermediate B.Sc. examination in this country, except, perhaps, on the physicochemical side, where there are a few omissions. As training for the conscientious student, who can be persuaded to work a reasonable proportion of the problems, the reviewer regards the book as admirable. Comprehensive revision, to lay particular stress on dimensional units, and to standardise nomenclature and symbols, have increased its value. Indeed, it would not be impossible for more advanced chemists, conscious of a weakness on the mathematical side, to derive benefit from an hour or so spent on turning the pages with attention each week.

There are one or two criticisms that seem worth while. The discussion of the atomic theory with reference to the build up of electronic shells is perhaps a little too simplified, since it gives no hint of the formation of transitional elements by the filling of inner levels. The idea is not too difficult for an elementary student to grasp, and the failure to introduce it at this stage may form a picture in the student's mind which will make the conception more difficult to grasp at a later stage. Again, there is no indica-

tion, in the chapter on solubility product, that this phenomenon is *not* the truth, the whole truth and nothing but the truth about the precipitation of the insoluble sulphides. It is regrettable that the interdependence of solubility product theory and the insoluble sulphides seems as permanent as, in an earlier age, the phlogiston theory. It is perhaps too much to expect that all text-books should cut out this anomaly until they can supply a simple exposition of a more rational and up-to-date theory; but at least anyone who tackles the problem, on paper or in class, should insert a warning that for this purpose solubility merely offers a rough and ready, and all too frequently a misleading rule of thumb, and that solubility product is not the corner-stone of analytical chemistry that it is so frequently represented to be. It may be argued that it took leading chemists ten years after the Braggs' work to accept their ideas in the field of strong electrolytes, but these ideas are now such common chemical knowledge that even the average student must have his faith shaken by the unblushing application of the law of mass action to silver chloride. And when he later finds a problem which suggests to him, in defence of his practical experience, that cobalt sulphide will be precipitated by H_2S in a solution that is 1.2 N in HCl , he may be forgiven for divorcing, even more than is his wont, the fields of theory and practice.

In the preface, the authors state that "the use of the slide rule is to encourage in chemical calculations" but, though they give a full appendix on the use of logarithms, they give no instruction on how to handle a slide rule. The appendix on significant figures, also could well be supplemented by an elementary statistical treatment of precision which, in view of the growing importance of statistical method in chemistry, would provide a useful introduction, and a none-too-early one, to a necessary part of the mathematical training of the complete chemist. These criticisms are offered to the authors in a helpful spirit, as attempting to indicate ways in which, in the opinion of the reviewer, a valuable elementary text could be made even more useful to students.

Technical Publications

THE characteristics and uses of aluminium paint and paste with information on painting technique, storage, properties, and testing are dealt with in "BA Aluminium Paste," the latest publication of the British Aluminium Co., Ltd. This is a book for the user, and is excellently produced and illustrated to present a permanent short reference work for the increasing numbers taking advantage of the high quality of resistance of coatings incorporating aluminium metal.

Aluminium paste contains about one-third its weight of mineral spirits, is cleaner to handle and easier to mix than the dry aluminium flake powder. Considerable space is also saved in storage.

* * *

A useful increase of rubber technology is continually afforded under the U.S.-U.K. liaison scheme compiled by the Research Association of British Rubber Manufacturers from American and other sources, of which the current "supplementary Reports on Synthetic Rubber" (HMSO Supplement No. SS19) is a good example. This comprises three sections of the subject, GR-S Latexes and the properties and testing of GR-S Vulcanised and GR-S Unvulcanised. The section dealing with unvulcanised GR-S contains most of the fundamental matter, presented in the form of short abstracts, dealing with such subjects as the free radical reactions with rubber, evaluation and selections of a GR-S polymer and rheological tests on GR-S. The "vulcanised" section is concerned with practical studies of products, heat generation in tyres and air permeability.

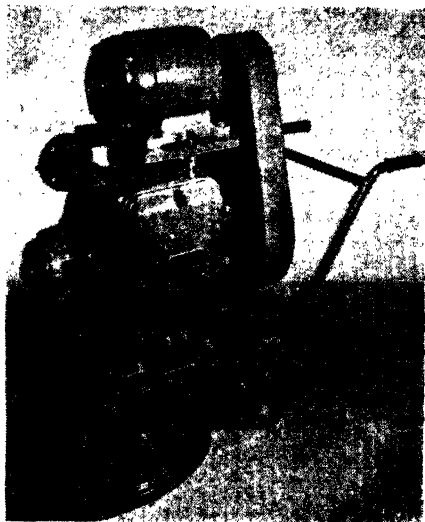
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"Materials and Methods Manual," published at periodic intervals by the Aluminium Association, New York, deals in its last 15 pp. number with aluminium alloy castings. This discusses the various alloys, advantages and disadvantages of the different casting methods and design limitations, and gives information on finishing of all types of castings. Besides many figures and tables, the review is completed by a bibliography on its particular subject.

* * *

"Facts About Philips" is a new booklet, profusely illustrated, which describes briefly the whole wide range of products of Philips Electrical, Ltd.—radio, television, lamps, high frequency generators, industrial diamond dies, welding machines, medical equipment, etc.

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Mobile pump with V-belt drive from an overhead mounted motor on a hinged base plate suitable for pumping liquids for short periods

(Megator Pumps & Compressors, Ltd.)

Workers' mid-day meals have been the subject of considerable attention recently, including letters to the daily Press. "A new approach to Production" by H. V. Black, published by Intel (Caterers), Ltd., comes at an appropriate time. Men, machinery and materials are the three factors on which production depends, and all too often, as this booklet points out, the actual physical welfare of the human being is neglected. Intel, Ltd., claims to approach this matter in a new way, and the Intel plan recognises that feeding the employee where he works is fundamentally an industrial operation and not a catering one."

* * *

Zinc Development Association, Lincoln House, Turl Street, Oxford, is offering freely to those who need it a new booklet on galvanising called "Hot-dip Galvanising and Rust Prevention" (52 pp.). The story of the development of galvanising is clearly told, the scientific side being well described in simple terms. This excellent survey of a difficult subject can be recommended.

Personal

AMONG the newly elected Fellows of the Textile Institute are DR. PAUL LAROSE, of Ontario, Canada, and DR. WILLIAM SIMPSON SHAW, of Manchester. Dr. Larose, who has published a number of works on textile subjects, was textile adviser to the Canadian Department of National Defence during the war, and was awarded the M.B.E. For the past eighteen years he has worked as research chemist with the National Research Council in Canada. Dr. Shaw is an external assessor of M.Sc. theses for Manchester University, and a member of the research control committee of the Wool Industries Research Association.

PROF. DR. MAX HARTMANN, a member of the board of the Ciba, A.G., Basle, and chief of the company's pharmaceutical research division, has recently been awarded the title of Doctor of Technical Sciences *honoris causa* by the Federal Technical Institute (ETH), Zurich. Dr. Hartmann, who had studied at Zurich and Munich under Baeyer, Willstätter and Wieland, has done distinguished research work in organic chemistry and pharmacology. Dr. Hartmann's chief discovery is the sulphonamide Cibazol (1938) and a second member of this group, Elkosin (1941). Over one hundred patents have been taken out in his name.

DR. T. REICHSTEIN, who holds the chair of chemistry at Basle University, has been awarded the Marcel Benoist prize for 1947 for his outstanding research work and discoveries in the field of vitamins and hormones. This prize of 20,000 Swiss francs is awarded annually to a Swiss scientist—or any scientist who has been a resident in Switzerland for five years—who has in any particular year made the most useful scientific discovery, invention or research, particularly in those branches of science which are of importance to human welfare.

SIR EDWARD APPLETON, secretary of the Department of Scientific and Industrial Research, has been awarded the Valdemar Poulsen gold medal by the Danish Academy of Technical Sciences for his contributions to radio technics and particularly achievements in research on the ionosphere. Sir Edward has also been appointed principal and vice chancellor of Edinburgh University, in succession to Sir John Fraser, the surgeon.

The following officers have been elected by the Pharmaceutical Society of Ireland, of which membership now exceeds 900. MR.

P. A. BRADY, president; MR. T. C. SCOTT, vice-president; MR. J. GLEESON, treasurer, all re-elected. Council members: MESSRS. M. COSTELLO, R. DALY, P. BROOKE-KELLY, J. P. KISSANE, A. A. TOHER, C. D. O'SHEA and SENATOR F. LOUGHMAN.

At the meeting of the general council of the British Standards Institution the following officers were elected: MR. ROGER DUNCALFE, chairman of the general council; MR. JOHN RYAN, chairman of the finance committee; MR. HERBERT J. MANZONI, chairman of the Building Divisional Council.

FURNACE COKE SUPPLIES

ASKED by Mr. Erroll, in the House of Commons last week, what steps he was taking to ensure that greater supplies of furnace coke were made available to the iron and steel industry, Mr. Gaitskell (Minister of Fuel and Power) said, apart from the fact that the National Coal Board had standing instructions to meet in full the coal requirements of all coke ovens, special arrangements had been made for the production of furnace coke at certain Coal Board ovens and at part of the Beckton Gas Works where formerly coke of this type was not manufactured. In addition, supplies had been diverted from other consumers who were in a position to use gas coke instead of furnace coke. Mr. Erroll asked if these plants would remove the bottleneck in furnace coke which hitherto had impeded output of steel. Mr. Gaitskell said he thought that so far as next winter was concerned there should be no interference at all. The long-term position depended on the development of the programme for additional coke oven plants.

Students in Industry

The Royal Technical College, Glasgow, will repeat next January the successful experiment which was initiated this year with its final-year applied chemistry students, who are virtually chemical engineering technicians ready to enter industry. With the co-operation of many leading firms, these students will spend two to four weeks as guest workers on the management side of these undertakings studying industry in action and assessing industrial practice against the theory and training already given. Industrialists who co-operated a year ago were satisfied that the experiment was a good one.

Home News Items

Vermiculite Produced in England.—Dohm, Limited, announces that it has started producing vermiculite at its Stoke-on-Trent works. This is the first commercial vermiculite project in this country.

Safety in Chemical Works.—In recognition of the success of the recent conference at Harrogate on accident prevention in chemical works, the Association of British Chemical Manufacturers has arranged for a similar meeting to be held at the Royal Hotel, Scarborough, from Friday, October 7, to Sunday, October 9, 1949.

Recovering Fish Waste.—Fish offal which in the past has been tipped into the sea at Peel, Isle of Man, will in future be processed to produce oil and fertilisers. A local company has been formed to develop this new industry at the principal Manx fishing port, where the bulk of the island's herring catch is landed in the summer months.

Price of Rosin Reduced.—The Board of Trade announces that as from December 1 the price of rosin sold through the agency of United Kingdom Naval Stores Association, Ltd., 46 St. Mary Axe, London, E.C.3, is reduced as follows: Subject to availability, any buyer prepared to take delivery in a lot of 50 tons or more on cost and freight terms, with marine insurance covered, will be able to do so at a reduction of £2 per ton on the current ex-warehouse price for all grades.

To Weymouth.—The Bristol Instrument Co., Ltd., West Twyford, London, N.W.10, is removing on December 10 to a new factory at Weymouth which will permit very large expansion of production immediately and in the future, having been specially designed, and which has its own sports grounds and excellent staff amenities. There the company's entire range of instruments will be produced and the head office will be located. The Brent Crescent address will be retained as a London office.

Frustrated Exports.—The Board of Trade states that some wholesalers who are entitled to take the higher wholesale margins on their normal home trade are of the opinion that they may take these margins on sales of goods bought by them for export and now released for the home market as frustrated exports. The board holds that the price for the sale of these goods should be controlled by the Miscellaneous Goods (Frustrated Exports) Order and must in no case exceed the price paid, plus the amounts paid for storage, carriage, and insurance, plus 5 per cent on the total.

Benn Brothers, Ltd., Bouverie House, Fleet Street, London, E.C.4, proprietors of *The Hardware Trade Journal* with which is incorporated *Ironmongery*, have acquired the goodwill and copyright of *The Hardware Trades Directory*.

Share Quotations.—Arrangements are being made to introduce the ordinary shares of Bowmans Chemicals on the Liverpool and London Stock Exchanges at an early date. The shares are of 4s. nominal value fully paid, and will be introduced at about 7s. 3d., to include the final dividend.

Weekly Coal Output.—Last week's coal output in Britain fell after a period of successive increases, the total, which ranked eighth in the list of weekly figures since last December, being: 4,261,100 tons (4,062,400 tons deep-mined, 178,700 tons open-cast). Previous week: 4,320,800 tons (4,136,600 tons deep-mined, 184,200 tons open-cast).

Wire Ropeworks Fire.—Many thousands of pounds' worth of damage was done by fire at the works of the Whitcross Co., Ltd., wire rope manufacturers, Milner Street, Warrington, recently. The entire building, covering an area of 12,000 sq. ft., and housing valuable equipment and machinery, was burned out. The Whitcross Co., a subsidiary of Rylands Brothers, Ltd., employs nearly 12,000.

I.C.I.'s Non-Ferrous Metal Works.—Tractors and ground-leveling machines are working on the new 50-acre I.C.I., Ltd., factory site at Kirkby trading estate, Liverpool. The factory which is expected to cost about £1 million, will eventually give employment to 3000 men, producing copper tubes and other commodities, mainly for export. The site has a 900 yards frontage on the East Lancashire Road, and the factory, when completed, will be the largest of its kind in Europe.

"Migrant" Workers.—The chemical, soap and paint industries in Scotland are still affected by a shortage of female labour and see no immediate prospect of making good this deficiency. This in turn means that limitation of output arising from scarcity of labour, will be maintained. Efforts have been made repeatedly to bring back former skilled workers, now married, and some success has been obtained, but this effort has been offset by the high turnover of junior labour. Employers in Scotland believe that this situation will persist until there is more labour on the market than there are jobs.

Next Week's Events

MONDAY, DECEMBER 6

The Royal Institute of Chemistry (London and South-Eastern Counties Section). Acton Technical College, High Street, W.3, 7 p.m. A. Albert: "Drug Action, Ions and Neutral Molecules."

Society of Chemical Industry. London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 6.30 p.m. Dr. H. Seligman: "Application of Radio-active Elements in Industry."

Hull Chemical and Engineering Society. Royal Station Hotel, Hull, 6.30 p.m. C. N. Hillier: "Pumps and Pumping."

TUESDAY, DECEMBER 7

Society of Chemical Industry (Chemical Engineering Group). Geological Society, Burlington House, London, W.1, 5.30 p.m. Dr. E. F. Edson: "Radiation Hazards and their Control."

Manchester Federation of Scientific Societies—Pharmaceutical Society. Papers on the new British Pharmacopoeia, Prof. H. Brindle and others.

Sir Halley Stewart Trust, Memorial Hall. Farringdon Street, E.C.4, 6 p.m. Prof. D. W. Brogan: "The Atomic Age. VI—America as Atlas."

WEDNESDAY, DECEMBER 8

Society of Chemical Industry (Food Group). BIRMINGHAM: University, Edmund Street, 6.30 p.m. Dr. L. F. Wiggins: "The Sugar Cane as a Source of Raw Materials for Chemical Industry."

Society of Instrument Technology. Manchester College of Technology, 7.30 p.m. Mr. Longworth: "Functional and Performance Characteristics of Automatic Temperature Control."

British Association of Chemists. Northern Polytechnic, Holloway Road, N.7, 7 p.m. W. P. Henderson: "Chemistry and the Railways."

Society of Dyers and Colourists. MIDLANDS SECTION: Loughborough, King's Head Hotel, 7 p.m. G. S. J. White: "Interfaces in Industry." NORTHERN IRELAND SECTION: Belfast, Queen's Hotel, 7.30 p.m. T. L. Mott: "Modern Bleaching, Dyeing, Printing, and Finishing Machinery" (illustrated by film).

THURSDAY, DECEMBER 9

Institution of the Rubber Industry. LEICESTER: College of Technology, 7 p.m. Discussion. Dr. W. McG. Morgan: "Carbon Blacks."

Society of Chemical Industry (Fine Chemicals Group). London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 7 p.m. Dr. W. A. Sexton: "The Chemistry of Plant Growth Regulators." NOTTINGHAM: Microbiological Panel, joint meeting with Nottingham Section. F. C. Bawden: "Some Properties of Plant Viruses."

The Chemical Society. EDINBURGH: North British Station Hotel, 7.30 p.m. Dr. D. W. Kent-Jones: "Bread and its Influence on History." LONDON: Burlington House, Piccadilly, W.1, 7.15 p.m. W. A. Cowdrey and D. S. Davies: "The Kinetics and Mechanism of the Sandmeyer Reaction"; S. J. Grigg and R. I. Razouk: "The Kinetics of the Thermal Decomposition of Magnesium Hydroxide"; D. H. R. Barton and K. E. Howlett: "The Kinetics of the Dehydrochlorination of Substituted Hydrocarbons, Parts I, II and III." MANCHESTER: University, 6.30 p.m. Prof. C. K. Ingold: "Aromatic Nitration." NOTTINGHAM: University, 6.30 p.m. Reading of original papers.

British Ceramic Society (Refractory Materials Section). Royal Sanitary Institute, S.W.1, 10 a.m. (Two days.) Subjects include: "Effect of Heat on Clays"; "Deformation of Silica Refractories in Torsion"; "Ceramic Materials for Chemical Plants"; and "Zircon Refractories."

Institute of Metals (London Local Section). 4 Grosvenor Gardens, London, S.W.1, 7 p.m. E. Schener: "The Solidification of Metals, with special reference to Continuous Casting Processes."

FRIDAY, DECEMBER 10

Oil and Colour Chemists' Association. Engineers' Club, 2 p.m. Dr. J. K. Aiken and H. Jones: "Sebacic Acid Polyesters in Surface Coatings."

Royal Statistical Society (Industrial Applications Section, London Group). Mr. A. W. Swan: "The Functioning of a Statistical Department in the Steel Industry."

The Royal Institution of Great Britain. 21 Albemarle Street, London, W.1, 9 p.m. E. K. Rideal: "The Emission of Light in Chemical Reactions."

SATURDAY, DECEMBER 11

Institution of Chemical Engineers. MANCHESTER: College of Technology, 3 p.m. F. F. Rixon: "The Absorption and Desorption of Carbon Dioxide in or from Water Using Packed Towers."

Overseas News Items

Belgium's Coal Output.—Belgium's coal output reached in October, for the first time since the war, the monthly average of the years 1936-38, i.e., 2,431,000 tons.

Brazil's Alkali Industry.—Four important chemical concerns are to co-operate in developing the Brazilian alkali industry, based on rock salts from the deposits at Cotinguiba, near Aracajú in the State of Sergipe.

Cement in Argentina.—The Portland Cement Manufacturers' Association has announced that production in Argentina for the first nine months amounted to 1,032,997 metric tons compared with 876,488 metric tons in the same period last year.

Colombian Mining Enterprise.—The Empresa Siderurgica Paz del Rio has been established in Bogotá, Colombia, for the mining of iron-ore and hard coal. Its capital is 100 million pesos and it will have as technical advisers two U.S. firms, the Koppers Company, and the Freyn Engineering Corp.

Finland Could Export Wolfram Ore.—Wolfram ore has for some time been known to occur in the Ylöjärvi (near Tampere) copper mines of the Outokumpu O/Y, and a recent survey of the economic possibilities of this deposit has shown that exports could be started on a small scale.

New Swedish Machine.—Woodpulp machines fitted with a new Swedish regulator are stated to have worked very satisfactorily. The regulator is connected to the valve which supplies water to the pulp. The slightest change in the concentration of the latter is at once transmitted to the regulator, which then makes the necessary adjustment.

U.S. Chromite Deposits.—The exploitation of the chromite deposits in Washington, Cal., believed to be the largest in North America, is to start this month. The deposits, which extend into Oregon, are estimated to contain 4 million tons of chrome ore. The properties are controlled by the American chrome and magnesium industries.

India Suspends Some Sodium Imports.—The Government of India has decided to suspend the issue of licences for the import of caustic soda and soda ash from dollar and hard currency areas. Supplies are said to have arrived recently which have improved the stock position and licences for considerable quantities are outstanding. Restrictions on the distribution of these two alkalis have also been lifted.

Chemists' Club Golden Jubilee.—The 50th anniversary of the Chemists' Club of America will be celebrated by an informal dinner at the Clubhouse, New York, on Thursday next, December 9.

Aluminium Works Rebuilding.—The Aardal works, Norway, which were destroyed by fire, are expected to be rebuilt within the next 18 months or two years. Annual capacity will total 24,000 tons of aluminium.

Austria to Make Saccharine.—A factory in Vienna has recently taken up the manufacture of saccharine and expects to produce two tons monthly by the end of this year, sufficient to cover home requirements. An expansion of output, scheduled for next year, should leave an export margin.

U.S. Steel Output.—The highest output figure in the U.S. steel industry was expected to be attained last week, according to estimates by the American Iron and Steel Institute. Steel mill operations were planned at 100.1 per cent of rated capacity, with production at 1,804,300 tons.

Dutch Plastic Material.—The N.V. Chemische Industrie Magenta, Delft, Holland, is reported to be producing a new plastic material called Methacrylatarsen. Commercial output is to begin early next year. The company also plans to produce a number of other plastic materials.

Sweden's Iron Ore.—The Swedish Geological Inspection Department has reported that it would not be reasonable to expect that State to spend large sums on prospecting for iron ore deposits, since known deposits contain all the ore that can be transported and marketed under present circumstances.

Aluminium Companies Link Up.—Mr. Chifley, Australian Prime Minister, recently announced plans were being prepared for the link up of the British Aluminium Company and the Australian Aluminium Commission for the production of the metal in Tasmania. The British company had sent a representative to examine bauxite deposits in Borneo, the Solomons, and other Pacific islands.

Dismantling Krupps.—A British Military Government statement this week indicates that the greater part of the Krupps steelworks at Essen is to be disposed of or destroyed—222 to be disposed of and 23 destroyed, while 73 badly damaged buildings are to be demolished. Buildings numbering 127 will be retained for light industries. The demolitions will yield a large quantity of steel scrap for export.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

GLASS MACHINE & EQUIPMENT CO., LTD. Seven Kings. (M., 4/12/48.) October 29. £500 debenture to J. J. A. Dunham, Chadwell Heath; general charge.

NEW INSULATION CO., LTD. Gloucester. (M., 4/12/48.) November 2. £30,000 charge, to Equitable Life Assurance Society; charged on property fronting Bristol Road (formerly known as the Old Tramway Depot), Gloucester, and three pieces of land adjoining. *£50,000. July 14, 1948.

F. T. SEACRIM & CO., LTD. Cheltenham. (M., 4/12/48.) October 28. £4,500 (not ex.) charge, to Lloyds Bank Ltd.; charged on dwellinghouse and land with bungalow and outbuildings known as Barlands, Charlton Kings. *Nil. February 10, 1948.

IRISH ALUMINIUM CO., LTD. Dublin. (M., 4/12/48.) October 7. £37,500 debentures (50 debentures of £750 each); general charge; also October 7, mortgage in support of debentures for securing all moneys due or to become due to the Munster and Leinster Bank Ltd., on foot of an issue of 50 debentures of £750 each; charged on (1) Part of the lands of Nenagh South, Co. Tipperary; (2) piece or parcel of land at Nenagh South. *£25,352. April 7, 1947.

IRISH MOULDEX, LTD. Dublin. (M., 4/12/48.) September 24, debenture securing such sums as are now or shall from time to time hereafter become owing to the Munster and Leinster Bank, Ltd. on the balance of its current account; charged on premises held under lease dated November 12, 1947, being part of the lands of Strandfield, situate at Kerlogue, Forth, Co. Wexford, also general charge.

Satisfactions

PERMA-LED METAL CO., LTD. London, S.E. (M.S., 4/12/48.) Satisfaction October 26, of charge registered December 16, 1947 (re 55, 63 and 65 The Highway, Chelsfield).

RUBBER & TECHNICAL PRESS, LTD. London, S.W. (M.S., 4/12/48.) Satisfaction October 30, of debentures registered March 21, 1944, to the extent of £200.

Company News

Changes of Name.—The name of **M. Rink** (Formerly **Arnold Rink**), Ltd., has been changed to **Wyndham Supplies, Ltd.**, and of **Q.D.P., Ltd.**, to **Service Paints, Ltd.**

The following increases in registered capital are announced: **Allied Colloids (Manufacturing) Co., Ltd.**, from £100 to £5500; **Allied Colloids (London), Ltd.**, from £100 to £600; **Basrah Petroleum Co., Ltd.**, from £9.8 m. to £10.5 m.; **Geigy Co., Ltd.**, from £20,000 to £400,000; **D. Hoyle & Co., Ltd.**, from £1000 to £2000; **Laboratory Suppliers, Ltd.**, from £3000 to £6000; **May & Baker, Ltd.**, from £265,000 to £662,500; **Mining & Chemical Products, Ltd.**, from £50,000 to £100,000; **Mosul Petroleum Co., Ltd.**, from £9.8 m. to £10.5 m.; **Petroleum Development (Qatar), Ltd.**, from £6,900,100 to £7,240,100.

New Companies Registered

Antitch, Ltd. (461,097).—Private company. Capital £5000. Manufacturing chemists, etc. Solicitors: Playne & Co., 9 Cavendish Square, W.1.

H. R. Browne (Chemists), Ltd. (461,332). Private company. Capital £2000. Manufacturing chemists. Directors: Mrs. E. M. Browne, Mrs. I. M. Clark. Reg. office: 44 Cornfield Road, Eastbourne.

Campbell & Mould, Ltd. (461,035).—Private company. Capital £1000. Manufacturers of chemicals and chemical processes. Directors: W. B. S. Campbell, Penlie Cottage, Warren Lane, Friston, Eastbourne; and H. A. Mould.

Pest Control Holdings, Ltd. (461,220).—Private company. Capital £1,000,000. To acquire the whole or part of the issued share capital of Pest Control, Ltd.; experts in all matters relating to the application of biology, hygiene and agricultural sciences, etc. Reg. office: Bourn, Cambridgeshire.

D. H. Roberts (Chemists), Ltd. (461,043).—Private company. Capital £5000. Chemists and chemical engineers, etc. Reg. office: Heygate Street, Walworth, S.E.17.

Chemical and Allied Stocks and Shares

BUSINESS in stock markets declined moderately earlier in the week, but with the beginning of the new Stock Exchange account buyers were more in evidence. After further gains, British Funds eased and there were small irregular movements in industrial

shares, although little selling was reported.

It is being assumed in some quarters that the yield factor must shortly switch investment buying from British Funds to leading industrials. Buyers of the latter are taking more than a short view, looking ahead to 1950, when it is assumed, voluntary dividend limitation may be lifted.

Chemical and kindred shares have shown firmness in accordance with the general trend. Imperial Chemical remained an active feature and at 49s. 4½d. yield slightly more than 4 per cent. Monsanto 5s. ordinary at 62s. 6d. yield rather less than 3½ per cent on the basis of last year's 45 per cent dividend. Laporte 5s. units have held their rise to 21s. 9d., Albright & Wilson (31s. 3d.) also kept last week's gain, Amber Chemicals 2s. shares were 9s. 6d., Fisons 59s. and Hardman & Holden 5s. shares were quoted at 27s. 6d. British Glues and Chemicals British Aluminium have held the rise which followed the success of the company's debenture issue.

British Oxygen (104s. 4½d.) remained active, the market assuming that when the company's expected new issue appears it is likely to take the form of an offer of additional shares on preferential terms to shareholders. There was further buying of Borax Consolidated on the belief that the uptrend in the company's earnings is continuing; and dealings up to 65s. were recorded. In other directions, De La Rue strengthened to 37s. 6d. still under the influence of the higher interim dividend, although it is realised the directors have stated that this does not indicate a bigger total payment for the year. British Match at 36s. 3d. remained firm on the hope that the Swedish Match Co., in which the company is a shareholder, may resume dividends 4s. ordinary remained at 20s. 3d. and at 50s. shortly.

Activity was shown in United Molasses up to the higher level of 51s. 3d. the assumption being that the tanker section of the business is earning larger profits and that the dividend will again equal 32 per cent. less tax. British Plaster Board at 23s. 4½d. have fully held their recent improvement, there being more confidence in the market that the dividend total may be kept at 25 per cent on which basis these 5s. shares would yield over 5½ per cent. A feature has been buying of Glaxo Laboratories on further consideration of the financial results and chairman's annual statement; the price advanced to £20.

Iron and steel shares have been much quieter, and in some cases market prices receded below their "take-over" valuations, Guest Keen being 48s. 3d., Colvilles 37s. 9d., Staveley 90s. 3d. and Stewarts & Lloyds

56s. 7½d. Shares of companies not on the nationalisation list were mostly firm with Tube Investments slightly over £6½, and T. W. Ward 66s.

Turner & Newall at 80s. have been firm, reflecting the view that the results may show a further rise in profits. The 4s. units of the Distillers Co. have further strengthened to 29s. 10½d. Boots Drugs eased slightly to 56s. 3d., Beechams deferred were 18s. 3d., Sangers 34s. and British Drug 5s. shares changed hands around 9s. 6d. Oils remained uncertain, small irregular movements predominating. Shell were 76s. 10½d., Burmah Oil 69s. 4½d. and Anglo-Iranian slightly below £8½.

British Chemical Prices

Market Reports

STEADY trading conditions are again reported on the industrial chemicals market, with the movement to the main consuming industries continuing on a fairly substantial scale. The volume of inquiry for export also continues at a satisfactory level. The week has not seen any important price changes and quotations in most sections remain on a firm basis. There is little of fresh interest to report in the coal-tar products market. Creosote oil, cresylic acid and the pyridines are all in good request, while pitch and carbolic acid are again active items.

MANCHESTER.—The Manchester chemical market continues to display a strong undertone in virtually all sections, although actual changes on balance for the week have been of little consequence. A steady volume of replacement business in the bread-and-butter lines has been reported on home trade account, with consumers in the textile and other industrial outlets pressing for good contract deliveries. On the export side, also, inquiries for shippers seem to have been maintained at around their recent level. In several sections of the fertiliser market, notably in the phosphatic materials, an active demand continues, and most of the tar products are in good request.

GLASGOW.—Conditions in the Scottish chemical market have shown little departure from normal during the past week, and there has been no unusual demand. Supplies coming from the south have been slightly delayed due to the weather, but sufficient stocks were available to buffer the delay. In the export market conditions have been a little better, import licences now being obtained in some countries a little more readily than in the past.

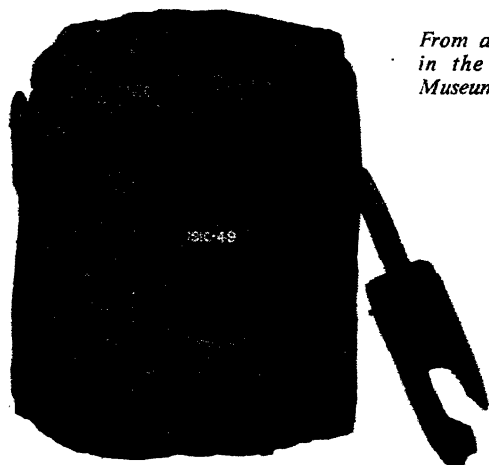
Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2 at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

- Anti-corrosion oils.**—N.V. De Bataafsche Petroleum Maatschappij, and W. David. March 20, 1946. 609,687.
- Process of manufacturing ferrous bodies containing silicon.**—American Electro Metal Corporation. April 28, 1945. 609,689.
- Production of polystyrene.**—Distillers Co., Ltd., H. M. Hutchinson, and J. J. P. Studinger. March 20, 1946. 609,692.
- Process for drying alcohols and ketones.**—Distillers Co., Ltd., and G. H. Twigg. March 20, 1946. 609,871.
- Aqueous wax emulsions.**—I.C.I., Ltd., and E. G. Cockbain. March 26, 1946. 609,698.
- Storage of liquefied normally gaseous material.**—W. W. Triggs. (Specialities Development Corporation.) March 21, 1946. 609,701.
- Insecticidal preparations.**—H. Hurst, and J. H. Schulman. March 21, 1946. 609,762.
- Manufacture of piperidylketones.**—Ciba, Ltd. April 10, 1945. 609,763.
- Manufacture of polyphosphates.**—Albright & Wilson, Ltd. March 22, 1946. 609,785.
- Production of cellulose esters.**—British Celanese, Ltd. March 30, 1945. 609,790.
- Manufacture of highly polymeric esters.**—W. K. Birtwistle. March 22, 1946. 609,792.
- Fibrous materials.**—I.C.I., Ltd. March 22, 1946. 610,096.
- Mouldings from highly polymeric linear esters.**—I.C.I., Ltd., J. S. Byers, J. C. Swallow, and J. M. Walter. March 22, 1946. 609,795.
- Herbicidal compositions.**—E. I. Du Pont de Nemours & Co. March 22, 1945. 609,878.
- Rotary fluid-pressure apparatus of the sliding vane type.**—Cox Patent, Rotary Pump, Ltd. March 25, 1946. 609,906.
- Preparation of derivatives of cholesterol.**—Glaxo Laboratories, Ltd., A. E. Bide, R. J. Nicholls, and P. A. Wilkinson. March 25, 1946. 609,913.
- Process for the manufacture of 4,2'-substituted thiazoliny]-2-substituted-oxazolones.**—Therapeutic Research Corporation of Great Britain, Ltd., I. M. Heilbron, A. H. Cook, and J. A. Elvidge. March 25, 1946. 609,919.
- Manufacture of pyrazine.**—Soc. des Usines Chimiques Rhone-Poulenc—(April 11, 1945.)* (Cognate Application 9197/46.) 609,924.
- Production of heat-sealable, transparent cellulose sheets and films.**—British Cellophane, Ltd. [March 27, 1945.]* 609,927.
- Copolymers of vinyl chloride.**—Distillers Co., Ltd., M. D. Cooke, and J. J. P. Staudinger. March 26, 1946. 609,940.
- Dyeing of highly polymeric linear esters.**—Imperial Chemical Industries, Ltd., A. S. Fern, D. McCreath, E. J. Vickers, and T. Vickerstaff. March 26, 1946. (Cognate Application, 9312/46.) 609,943.
- Dyeing of highly polymeric linear esters.**—Imperial Chemical Industries, Ltd., and T. Vickerstaff. (June 6, 1946.) 609,945.
- Dyeing of highly polymeric linear esters.**—Imperial Chemical Industries, Ltd., and A. S. Fern. (June 6, 1946.) (Cognate Applications 9310/46 and 9311/46.) 609,948.
- Method of and apparatus for obtaining moisture regain in fibrous materials.**—W. N. Hadley. March 28, 1946. 610,102.
- Processes for dissolving crude calcium aluminates.**—J. C. Seailles. March 22, 1939. 610,005.
- Process for the preparation of 2-methyl-2,3-di-halogen-tetrahydrofuranes and their conversion to Vitamin B₁ and the like.**—Chinoin Gyógyszer és Vegyszeti Termékek Gyára R.T. (Dr. Kereszty and Dr. Wolf.) May 25, 1940. 609,803.
- Contact apparatus for gas reactions.**—Spolek Pro Chemickou a Hutni Vyroku. June 22, 1940. 610,007.
- Preparation of complex metal amine salts.**—A. H. Stevens. (Albi Chemical Corporation.) Dec. 13, 1943. 609,807.
- Isomerisation of paraffin hydrocarbons.**—A. H. Stevens. (Standard Oil Co.) Dec. 23, 1943. 610,009.
- Fluorescent material.**—British Thomson-Houston Co., Ltd. Aug. 14, 1943. 609,711.
- Method and press for compacting metallic powder.**—American Electro Metal Corporation. Sept. 1, 1943. 610,011.
- Process for the production of pigments from cashewshell liquid or its constituents and derivatives.**—K. G. Kudva, and H. R. Kamath. Oct. 4, 1944. 610,014.
- Corrosion-resistant valves.**—A. H. Stevens. (Pfauder Co.) Nov. 1, 1944. 609,714.
- Processes for cracking and/or hydrogenating oils, tars and like hydrocarbons.**—T. O. Wilton. Nov. 20, 1944. 610,017.
- Method of polishing an article having a surface of nickel or of a non-ferrous nickel alloy.**—A. H. Stevens. (Battelle Memorial Institute.) Dec. 18, 1944. 610,019.
- Production of plastic compositions.**—Anglo-Iranian Oil Co., Ltd., E. S. Narmcott, A. Millien, and J. N. Haresnape. Dec. 19, 1944. 610,020.

Valves weren't *VERSATILE* in 1698...

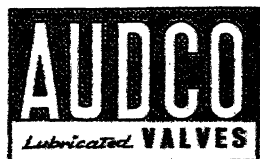
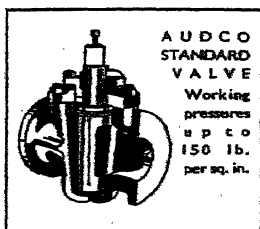


*From an exhibit
in the Science
Museum, London.*

*Elm wood Stop Valve for wooden water mains,
5½" diameter. A.D. 1698.*

This valve formed part of the wooden pipeline laid down in 1698 for the supply of water to the town of Gosport in Hampshire. It is formed from a solid block of elm 21" x 18" x 14", and was fitted with a solid elm plug with a squared iron spindle. As can be seen, the plug is now much shrunken and eroded, but originally, when swollen with water must have fitted the casing quite closely. Turning the plug, however, was probably a matter of some difficulty.

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Manufacture of intermediates for dyes, especially photographic sensitising dyes.—Kodak, Ltd., and E. B. Knott. May 10, 1945. 609,814.

Reduction of molybdenum compounds.—Westinghouse Electric International Co. Jan. 7, 1943. 610,033.

Methods of and apparatus for evaporating liquid.—Communications Patents, Ltd., and E. C. Stanley.—June 25, 1945. 610,036.

Production of polyvinyl chloride compositions.—Anglo-Iranian Oil Co., Ltd., E. W. M. Fawcett, and E. S. Narracott. June 28, 1945. 610,037.

Manufacture and use of reaction products of organic compounds containing sulphonic acid groups with quaternary ammonium compounds.—J. R. Geigy A.G. July 4, 1944. 610,038.

Preparation of esters of beta-benzyl mercaptoline, and derivatives and intermediates thereof.—American Cyanamid Co. July 17, 1944. 609,722.

Air temperature conditioning system.—Garrett Corporation. Oct. 11, 1944. 609,823.

Methods of and apparatus for effecting vaporisation at reduced pressure.—Communications Patents, Ltd., and E. C. Stanley. Sept. 19, 1945. 610,047.

Preparation of labile vinyl diacetonealkamine and the production of eucatropine hydrochloride therefrom.—W. R. Warner & Co., Inc. Oct. 19, 1944. 610,048.

Method of making dithiophosphoric acid esters of an alkyl-substituted phenol and mineral oils containing these compounds.—F. J. Cleveland. (Socony-Vacuum Oil Co., Inc.) Oct. 24, 1945. 610,056.

Production of magnesium cyanide.—American Cyanamid Co. Nov. 30, 1944. 609,731.

Manufacture of synthetic resins.—E. Hene. Nov. 5, 1945. 609,734.

Agents for colouring emulsions and dispersions, especially those of the oil in water type, and method for the production of such agents.—Grindstedvaerket A/S. June 2, 1942. 609,744.

Method for the transference of liquefied gases.—Solvay & Cie. June 8, 1942. 609,829.

Hydrogen production.—Hercules Powder Co. Feb. 6, 1945. 610,078.

Catalyst preparation.—J. G. Fife. (Shell Development Co.) Jan. 28, 1946. 610,080.

Process for the production of asphaltic bitumens.—N.V. De Bataafsche Petroleum Maatschappij. May 1, 1940. 610,086.

Production of linear polymers containing heterocyclic rings.—S. J. Allen, and J. G. N. Drewitt. Sept. 30, 1942. 610,304.

Method for making polyoxyalkylene glycols.—H. E. Potts. (Carbide & Carbon Chemicals Corporation.) Feb. 8, 1944. 610,505.

Method and apparatus for filtration.—C. L. Peterson, and C. J. Peterson. June 30, 1944. 610,507.

Production of basic polyamides.—S. J. Allen, and J. G. N. Drewitt. July 28, 1944. 610,311.

Manufacture of iron powder, and products produced therefrom.—Soc. d'Electro-Chimie, d'Electro-Metallurgie et des Acieries Electriques d'Ugine. March 1, 1943. 610,514.

Apparatus for classifying and separating solid bodies carried by a liquid current.—Soc. Anon. des Houilleres de Messeix, and J. A. Labouygues. Nov. 3, 1943. 610,516.

Acrylonitrile.—American Cyanamid Co. June 6, 1942. 610,326.

Coating of objects by cathodic disintegration.—W. Edwards & Co. (London), Ltd., and L. A. Holland. Sept. 7, 1945. 610,529.

Progress for the manufacture of agglomerated refractory products.—Soc. Anon des Manufactures des Glaces et Produits Chimiques de St-Gobain, Chauny & Cirey. July 9, 1941. 610,334.

Process for the removal of impurities of an organic nature from aqueous liquids or liquids miscible with water by means of synthetic resin gel grains.—O. J. Meijer's Dextrinefabrieken, N.V. April 19, 1944. 610,336.

Generation of acetylene or other gas.—Shawinigan Chemicals, Ltd. Dec. 30, 1944. 610,546.

Process for the removal of the oxide or salts of iron from zirconium compounds.—F. W. Berk & Co., Ltd., and F. W. Chambers. Jan. 11, 1946. 610,548.

Process for the manufacture of basic zirconium sulphate.—F. W. Berk & Co., Ltd., and F. W. Chambers. Jan. 11, 1946. 610,549.

Method of extraction of technically valuable products from emulsions, sludges, slurries, pulps, mashers, ground seeds and fruits and solid-water mixtures, by means of solvents.—J. W. McGregor & Sons, Ltd. Jan. 27, 1945. 610,339.

Method and apparatus for the recovery of alcohol from fermentation carbon dioxide.—Dansk Gaerings-Industri A/S. Sept. 11, 1940. 610,341.

Machines for forming pellets or small particles of plastic materials.—F. E. Brown. March 1, 1946. 610,560.

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Poor Rewards for Teachers

THE large increase in the number who to-day are concerned to see a new impetus given to the organisation of training in technology reflects a comparatively new awareness that what has been provided hitherto will not meet the needs of industry to-morrow. The growing shortage of technologists, even now, vouches for the truth of this. The repeated demand for technical men of all kinds, for chemical engineers perhaps most of all, is no new phenomenon, but the gap between the numbers required and those available is lengthening rather than diminishing, despite the heightened activity by the many voluntary bodies and authorities who administer what training is now given to industrial specialists.

From the viewpoint of the young chemical engineer, or his equivalent in other sections of industry, who has been lucky and active enough to secure a good basic equipment of knowledge the situation is anything but alarming. The law of supply and demand is at the moment operating almost entirely in his interest and there is no prospect of a slump unless the industrial pace is disastrously retarded. That, however, or something like it could very well occur if no improvement in the size of the new intake to industry is not achieved very quickly.

Industrialists and educationalists alike are studying how to attract the right type of trainee and what is the function of train-

ing in relation to the needs of business. Those deliberations made a promising start with the investigation by the Institution of Chemical Engineers before the war of the general subject of technological training. The Federation of British Industries issued in May, 1944, the report of its own education committee, which recognised the responsibility of industry for training its young men, both inside and outside the works. That report was particularly noteworthy for the special emphasis which it laid upon the "most serious shortage . . . of suitable teachers." In 1947, another committee of the FBI considered the position of industrial research in technical colleges. In 1945, a committee of the Cambridge University Appointments Board considered the relationship between university education and business. In 1946, the Percy Report advocated far-reaching developments in the status of technical colleges, and that report has been in part implemented by the Ministry of Education. The Parliamentary and Scientific Committee in 1947 issued a report which largely confirmed the finding of the Percy Committee. The Ministry has since set up a National Advisory Council on Education in Industry and Commerce.

The reason for all this activity was forcibly stated by the Barlow committee in its report on scientific manpower: "If we are to maintain our position in the world and restore and improve our

On Other Pages

<i>Leader :</i>		<i>New Steel Record</i>	780
<i>Poor Rewards for Teachers</i> ...	773	<i>Promoting Fuel Economy</i>	780
<i>Notes and Comments :</i>		<i>Norway's Uranium</i>	781
<i>Isotopes in Industry</i>	775	<i>Government Purchases</i>	780
<i>Wealth of Research</i>	775	<i>Combined Manufacture of Sulphuric and Nitric Acids</i>	782
<i>Plant Growth</i>	775	<i>Certified Scientific Glassware</i>	786
<i>Welfare and Efficiency</i>	775	<i>Making and Testing</i>	787
<i>Synthetic Resin Development</i> ...	776	<i>Large-Scale Glass Plants</i>	788
<i>Carbon Black Patents</i>	777	<i>Belgian Chemical Prospects</i>	789
<i>Costly CB Plant</i>	777	<i>New Uses for Herring Oil</i>	790
<i>Zinc Prices Raised</i>	777	<i>Accelerated Oil Hardening</i>	791
<i>U.S. Coal Gasification</i>	777	<i>European Oilseeds</i>	792
<i>Interdict Against Alurium Co. Sought</i>	778	<i>Revival in Italy</i>	792
<i>Beryllium Oxide Fatality</i>	778	<i>Chemical Progress in Ceylon</i>	793
<i>Safe Disposal of Cyanide Wastes</i> ...	779	<i>American Chemical Notebook</i>	794
<i>Heightened Request for Basic Chemical Materials</i>	780	<i>Improving Mineral Recovery</i>	795
		<i>Next Week's Events</i>	798

standard of living we have no alternative but to strive for that scientific achievement, without which our trade will wither, our Colonial Empire remain undeveloped and our lives and freedom will be at the mercy of a potential aggressor." That related primarily to scientists, but the case of the technologist is not substantially different. Among the many requirements for satisfying the need for much more ample opportunities for training none is more conspicuous than a full supply of teachers. The provision of accommodation can be assured with relatively less difficulty, but the enlistment of teachers, which shows no evidence of improvement since the FBI raised the subject, is a more complicated undertaking. Not everyone who can use a slide-rule can teach chemical engineering. Good teaching makes all the difference to the progress made by the student; about that there can be no difference of informed opinion. So, if our educational programme is to succeed it must be based on (a) a sufficiency of teachers, and (b) on teachers of ability.

What is the position? It is that teaching has been, is, and appears likely to continue to be, one of the ill-paid professions. The Burnham scale may serve very well for those who teach children in elementary or secondary schools: it is

quite inadequate for those who teach men and women in technical colleges to degree standard or beyond, in subjects as complex as chemistry, engineering and chemical engineering. A young graduate with some five years' experience in industry is likely to be offered about £450 a year on the Burnham scale as a teacher in a technical college. His successful pupils will be received into industry at commencing salaries of the order of £500 to £700 a year. The sooner the authorities realise that they must have the best teachers of these subjects and they must attract them by paying salaries equivalent to those paid in industry, the better it will be for everyone, and not least for industry and its trainees.

The remuneration of part-time teachers who help with the evening class work is even worse. They are offered a beggarly 30s. for two hours' teaching. That generally means in advanced technological subjects not less than four to six hours' actual work—for the lecture must be prepared in advance. When deductions have been made for income tax, travelling expenses and meals the net return is between 5s. and 15s., or from 1s. to 3s. an hour for this exacting work—all of it as overtime. Would any Trade Unionist work for such pay?

NOTES AND COMMENTS

Isotopes and Industry

REINFORCING earlier suggestions by other workers, Dr. H. Seligman, of the Atomic Energy Research Establishment, in his lecture to the Society of Chemical Industry on Monday, urged industry to make more use of isotopes. Prof. Emeléus, F.R.S., in his OCCA lecture series, it will be recalled, pointed out that increasing supplies were available, and that concentration on the use of isotopes—stable or radioactive—was welcomed by the Harwell staff. In February, 1949, the large pile will be in operation, and the range of activity of isotopes produced by "British neutrons"—so to speak—should equal that of the U.S.A. by the end of next year. A recent survey has disclosed that publications of works dealing with the use of radioactive isotopes numbered 2000 for medicine, but only 12 for industry. Prof. Paneth, at Durham, has organised courses of training next spring for workers in this field, stated Dr. Seligman. Applications in industry are anything but abstract. Production control of the thickness of plastic strip, or the layer thickness of sodium oleate on textile fibre, has been achieved using these materials, in addition to many uses in investigation. Radioactivity hazards are quite controllable, declared Dr. D. S. Edson, O.B.E., in an important paper on that subject to the Chemical Engineering Group, also this week. Our industry would be well advised to make inquiries and arrangements now to see that the scientific and technical staffs are equipped to wield the new weapon.

Wealth of Research

THAT the U.S.A. now enjoys very special advantages in this and many other departments of radiochemistry is now tacitly recognised practically everywhere, except perhaps in the U.S.S.R. How great has been the expenditure of money and effort is less often considered by any other than the specialist physicists, such as Sir Lawrence Bragg, who returned last week from an American lecture tour. He confirmed that the U.S.A. is spending millions of dollars on this branch of research and nearly every university has

its own atomic research plant. A good many of the findings are still necessarily of a tentative sort, but the very practical bias of those made known foreshadow some fundamental changes in technology.

Plant Growth

ONE of the more responsible reports on what is possible and what is not in harnessing radioactive materials to work outside the laboratory has just been released by the U.S. Department of Agriculture, showing that anticipations that by radiation "Jack and the Beanstalk" effects could be procured in agriculture have not been borne out by field trials. Experiments carried out in March, sponsored by the Atomic Energy Commission, applied to a fully representative range of field and vegetable crops a commercial radioactive product and also radium under controlled conditions. Both substances were applied 11 times, the former at three different rates. They are reported to have produced "no beneficial effect upon crop growth or quality." On the basis of one season's field trials the agricultural authorities feel justified in rebutting some of the over-optimistic claims which have been made—which testifies at least to a responsible and balanced outlook. This negative result, of course, does not mean that the two-year study planned is to be abandoned, and it has no bearing at all upon the more important study, using radioactive isotopes, of the behaviour of soils and fertilisers and the nutrition of plants.

Welfare and Efficiency

THE opinion expressed last week by Lord Trent, chairman of the Industrial Welfare Society, at its annual meeting in London, that management has a responsibility in promoting the welfare of workers in industry and that such an objective is a vital element in securing efficiency, is now, fortunately, fairly widely accepted. Not only is it accepted theory, but it is the principle put into useful practice by a large and growing number of industrial firms, including a high proportion of chemical and allied undertakings. The

Industrial Welfare Society's annual report showed a record membership, with 130 new firms joining during the year. They included firms in Australia, New Zealand, South Africa, India, Ceylon, Kenya, Norway, Sweden, and Denmark. It is profoundly to be regretted that nationalisation has enforced the withdrawal of some firms which were formerly members, but, the report states, the British Electricity Authority and the British Overseas Airways Corporation have continued "close co-operation" with the society, and the former not only is a member itself but has asked all its regional boards to become members. If any more industries are to be nationalised, the resulting "national bodies" will minimise their labour problems if they follow the sensible lead of the BEA and the BOAC. A high standard in this respect has been established, which it would be difficult for any public body or Government department to equal. One readily calls to mind the excellent conditions which exist at—for example—the I.C.I. works at Winnington, Cheshire, with its splendid canteen and recreational facilities, and a general working environment far above what is statutorily required, and the very genuine team spirit pervading some smaller enterprises, such as the growing scientific glassware industry on the Treforest Estate, Glamorgan (page 786 this issue).

Synthetic Resin Development

WHILE the development of oil refining in this country still has very far to go before the rich contributions which it can make to other industries can become fully evident, there are encouraging indications that exploitation will not be delayed by lack of preparedness when full supplies of the products of oil cracking are at hand. One other very promising member of the family given a Press view in London this week gives further evidence of this—the "fleximer" flooring which a subsidiary of the Dunlop Rubber Company has developed and is laying down extensively, with the blessing of the Ministry of Works, as substitute for unobtainable wood floors. It is not new, except to us, for America

has been using it, or something very like it, for not much less than 20 years, and the variety generally being laid at the moment owes its marked qualities of impermeability, endurance, resilience and cheapness not to oil but to rubber latex—also of Empire origin, it may be noted in passing. All the indications at the moment, however, point to the adoption of the oil-derived chemicals of the polyvinyl resin category as bonding agents for the concrete, aggregate and pigment of which a good many of the floors of the future seem likely to be composed. The resins of the type widely used now in adhesives are said to be in every way as effective as latex, and if the recent decline in prices of some other oil-derived chemicals continues the substitution will be inevitable and the cost of this very useful aid in modern construction may be lowered still further. Conclusions about prices are, of course, purely speculative, but there seems little doubt that this material, based on oil or rubber chemicals, is going to play an increasingly important part in affairs, especially in relation to laboratory and chemical works construction. Here its comparatively high resistance to corrosive materials and inability to harbour dusts, of which the lethal sort are very prominently in mind just now, and the fact that it is laid cold and very quickly should form strong recommendations.

Churchill the Artist

Whatever may be a man's profession, business or choice of career, nearly everyone has a hobby or form of relaxation in which he indulges when "off duty." Few are possessed of the dynamic energy and varied talents of Mr. Winston Churchill, but that will not debar the majority from taking a keen interest in what he has to say about hobbies in his new book, "Painting as a Pastime" (Odhams Press, Ltd., and Ernest Benn, Ltd., 10s. 6d.). He deals particularly with painting, which, he says, "came to my rescue in a most trying time." He was 40 before he ever handled brush or pencil, and he describes with characteristic gusto his first venture in oils. Reproductions of Mr. Churchill's paintings include some of those exhibited at the Royal Academy this year.

Carbon Black Patents

Processes of Phillips Petroleum Co.

THE Phillips Petroleum Company now has in this country, in addition to the patent No. 607,296 already described (*THE CHEMICAL AGE*, October 23), three specifications open to public inspection, Nos. 10889/1948 and 11336-7/1948. The first of these—the two others being similar with some modifications—is as follows:—

The method relates more particularly to production of carbon black for hardening or vulcanising purposes. Gaseous or liquid fuel and air, are introduced tangentially into a first cylindrical zone where they are burned and the combustion products and nitrogen pass into a second zone.

A hydrocarbon is introduced axially into the first chamber and passes into the second where it is converted to carbon black which is separated from the gaseous effluent.

The rate of injection into the first chamber is such that fuel and air, with resulting products and nitrogen, follow a spiral path in the first chamber; while the products of combustion and nitrogen follow a helical path adjacent to the cylindrical walls of the second chamber. The hydrocarbon may be either gaseous or liquid.

Controlled Flow

An inward flowing spiral of flame and hot combustion gases and nitrogen is maintained in the first zone, and is of helical form in the second. The first chamber has a diameter greater than its length, while the second reverses the proportions.

The apparatus illustrated includes a retort with combustion chamber adapted to be maintained at hydrocarbon-cracking temperature, bounded by heat-insulating and heat-radiating side wall, with conversion chamber as described. A heat dissipating enclosure is provided, communicating with the other end of reaction chamber.

Costly CB Plant

"We find our costs will be seriously higher than our earlier investigations led us to believe, but if it is at all possible to make an economic 'go' of this thing, we will push it forward."

This was the statement made by Mr. Godfrey L. Cabot, a principal of the American Institute of the Rubber Industry, at a meeting of the Liverpool Section. He was referring to the projected new plant for the manufacture of carbon black to be operated by the Cabot Carbon Company at Ellesmere Port, Cheshire.

The factory is the first proposed to be built in the United Kingdom in co-operation with American promoters under ERP.

U.S. Coal Gasification

Better Chemical Yields Sought

A NEW pilot plant for coal gasification has been opened by the Pittsburgh Consolidation Company at their research works, Library, Pennsylvania, U.S.A.

The plant, built and designed at a cost of \$500,000 in co-operation with the Standard Oil Company, takes either run-of-the-mine coal or char, the product of a low-temperature coal carbonisation process, and extracts high quality gas and tar rich in basic chemical raw materials.

Fluidised Solid System

The gasification pilot plant, making use of the Standard Oil Development fluidised solid technique, consists principally of a very large reactor, three stories high, into which are introduced oxygen and coal or char. These react with the oxygen at high temperature and the resulting synthesis gas is a mixture of carbon monoxide and hydrogen.

Three general uses can be made of this gas: (1) as a low B.Th.U. fuel, (2) enrichment to a higher B.Th.U. content and (3) as the raw material for production of chemicals and synthetic liquid fuels, including kerosene, diesel fuels and gasoline.

Supporting the project, the company has opened a research laboratory in which work is being done both on the gasification project and on improved methods of coal carbonisation and the refining of resulting tars, and from this it is hoped to improve the economic status of the coal industry.

Utilisation of the fluidised solid technique in the carbonisation of coal is also expected to aid in cheaper production (on a continuous, rather than a batch basis) of three valuable coal products; gas for fuel, tar for chemicals and liquid fuel, and char for domestic fuel or the raw material for gasification. In effect, char is finely divided coke.

The laboratory also hopes to develop new methods of tar refining which will yield a wide variety of high value chemicals, distillate fuels and residual fuels.

Zinc Prices Raised

The Ministry of Supply announces increased prices for zinc and zinc products with effect from December 2. The new maximum prices per ton are:—G.U.B. and prime western zinc, £106; refined and electrolytic zinc, £106 15s.; not less than 99.99 per cent pure, £108 5s.; zinc sheets, £113; boiler plates, £116 (all these prices raised £14 a ton); zinc oxide (red seal), £99 5s.; zinc oxide (green seal), £100 15s.; zinc oxide (white seal), £101 15s. (all these prices raised £12 a ton).

Interdict Against Aluminium Co. Sought

Alleged Damage by Fluorides in Scotland

MORE than a week has been occupied in the Scottish Court of Session and a number of expert witnesses have been called in the continued hearing before Lord Birnam of the application for an interdict against the North British Aluminium Co., Ltd., to prevent the company manufacturing aluminium at their Fort William factory by any means which would permit the release of noxious fumes to the detriment of vegetation and animals in the neighbourhood. The applicants are the Ben Nevis Distillery (Fort William), Ltd., and the managing director, Mr. Joseph W. Hobbs, who is tenant of Inverloch Castle and estates surrounding the aluminium works.

Damage Not Proved

Among the witnesses called in the early stages were Mr. John Neusch, a Venetian engineer, who spoke on behalf of the efficiency of the plant installed to arrest the dispersal of fluorine, and university specialists who spoke for and against the contention that plant growth in the neighbourhood had already sustained damage.

Dr. Malcolm Wilson, head of the Mycology Department, Edinburgh University, testified that he could only assume that damage had been done to trees on the neighbouring Inverloch estate by fumes from the aluminium factory. There was no exact proof that fluorine could damage trees. No experiments had been carried out under controlled conditions, except in Oregon in the U.S.A., where climatic conditions were different. He did not agree that the primary cause of damage to trees was due to fumes. Any damage was, in any case, very slight and practically inappreciable.

At a later stage evidence was given by Miss Joanna Franks, a principal Civil Service official, who said that, if the Lochaber aluminium works ceased to produce its average yield of 22,000-23,000 tons of metal annually, it would be necessary to import from Canada or the U.S.A. additional aluminium to the value of more than \$7 or \$8 million. Supplies could not be obtained in any material quantity from non-dollar areas.

The assistant general manager of the Lochaber works, Mr. F. N. Goss, said that about 1000 tons of fluorides were

being discharged annually from the works, and the company was anxious to stop it, as they would do in time. The whole discharge, if recovered, would be worth £56,000. He denied the company had installed new furnaces only when it was possible by using gas scrubbers to extract valuable fluorides, or that unwillingness to erect fully effective recovery plant was because it would be only a temporary expedient pending the general reconstruction.

The reconstruction plans were referred to again by Mr. W. G. Thomas, director and general production manager of the aluminium company, who said of the petitioners' claim that the "smoke nuisance" could be remedied in two or three months. "Had such a thing been possible is it likely that we would have wasted the time and money through the years that we have?" The reconstruction and the installation of new plant, which would end the fume emission might be finished in 1950, but more probably the latter part of 1951.

More than 800 were employed at the Lochaber factory, and if production was stopped by the granting of an interdict there would be an immediate effect on other works of the company at Burntisland, in Fife, where nearly 600 were employed, and at rolling mills belonging to the company in Staffordshire, Lancashire, and Falkirk.

Already £259,000 had been spent on the reconstruction or orders to that amount placed with the manufacturers. When the reconstruction work was completed the amount of fluorine discharged would be infinitesimal.

Asked by Mr. C. W. G. Guest, K.C., counsel for the petitioners, to describe what reconstruction had already been carried out, Mr. Thomas stated some 20 furnaces had been cleared, new foundations were being laid, and the first of the new furnaces—he did not know how many—were now under construction. Some of the new furnaces would go into production in March or the second quarter of next year.

To counsel's suggestion that the company had taken no real positive steps to eliminate the discharge of noxious fumes from the factory, Mr. Thomas replied—"My answer to that is the company has taken more steps in the last two years to get rid of this trouble than the whole industry has taken in the previous 48 years of its existence."

Mr. Guest—I put it to you that you did not embark on your scheme of reconstruction until you had a method of achieving efficiency of production at a cheap cost, and at the same time you saw also the chance of recovering valuable by-products?—Nothing of the kind.

Beryllium Oxide Fatality Reveals Poison Hazard

THE recent death of a research physicist, from what the East London coroner termed beryllium compound poisoning, draws attention to yet another substance used, or likely to be used, in industry, for which it seems probable that new Factory Act regulations may have to be made. The victim, Mr. Jack Palmer (36), of Crouch End, London, N., was stated at the inquest to have been working on the development of fluorescent lighting tubes and in the course of his work utilised materials containing beryllium oxide. This was between December, 1941, and December, 1942. He completed his work with beryllium oxide in 1942 and remained apparently well until 1945.

At present there are no specific legal obligations on producers or users of beryllium or its derivatives to take any precautions except such as exist in regard to other industrial dusts. The authorities were not aware of the existence of special hazards associated with beryllium.

H.M. Factory Inspectorate has taken note of the circumstances of the present case of poisoning, and the prospect of framing further regulations is being studied.

It should be noted that the present case concerns the death of a research worker and not one engaged on the actual making of fluorescent tubes, for which purpose, it is understood, beryllium oxide has been fairly generally superseded.

SAFE DISPOSAL OF CYANIDE WASTES

Toleration of Percolating Filters at Varying Concentrations

THE elements of the problem which has lately engaged the close attention of more than one research organisation, the effect of cyanide on the treatment of sewage in percolating filters, were presented recently before a Kentish section of the Royal Institute of Chemistry. The presentation was by Mr. A. E. V. Pettett—whose co-author, Mr. H. M. Thomas, was unavoidably absent—who briefly discussed the guise in which the problem of cyanide effluents most commonly arose.

Waste waters from certain electro-plating and metal-hardening processes contained cyanides in sufficient concentration to render those liquids unsuitable without treatment for discharge to a river. Chemical processes were available by means of which the waste waters could be partially or completely freed from cyanide, or in some circumstances the waste waters might be discharged, without treatment, into a sewer.

If waste water was to be admitted to a sewer it was important to know what concentration of cyanide could be tolerated by the biological methods used for treatment of sewage. Other investigators had shown that concentrations greater than one part of HCN per million interfered with treatment of sewage by the activated sludge process.

In the present investigation the effect of cyanide on treatment of settled sewage in experimental percolating filters was studied. At a concentration of two parts HCN per million interference with nitrification was observed, and at four parts per million the biochemical oxygen demand of the filter effluent was appreciably increased. At concentrations up to 10 parts per million 98 to 100 per cent of the cyanide was destroyed by passage through the filter.

The Treated Sewage

Sudden addition of a dose of 30 parts of HCN per million to sewage treated in a filter inhibited nitrification and led to production of an effluent of extremely poor quality. On continued application of sewage containing this amount of cyanide the filter slowly recovered its biological activity and eventually produced an effluent of satisfactory quality, free from cyanide.

Interference with the operation of a filter was much reduced by pre-treatment of the cyanide by chlorination in alkaline solution. Effluent from a filter receiving sewage containing cyanide was toxic to fish when the effluent contained more than 0.1

part HCN per million. Effluent from a filter receiving pre-treated cyanide was slightly toxic but became non-toxic when neutralised.

Mr. Lewin, who opened the discussion, commented on the lower upper limits of 30 p.p.m. and mentioned work on thiocyanates up to 100 p.p.m. He also commented on the high nitrite figures. In regard to the small effect on biochemical oxygen demand, Mr. McLachlan asked if the problem could not be met by installation of balance tanks at works using cyanides to arrange for slow discharge, and mentioned an instance of percolating filters that dealt with heavy simultaneous discharge of lead chromate and prussian blue.

The Phenolphthalein Method

Mr. Monk asked if high nitrite could be due to the formative organisms being more resistant to cyanides. He also asked for more information on the estimation of cyanides and mentioned some difficulties of phenolphthalein method.

Mr. Pettett said that 30 p.p.m. was not the upper limit that could be dealt with, and mentioned some work now in hand which showed that the organisms could survive much higher concentrations if supplied with suitable nutrients. The reason for the high nitrite and undiminished biochemical oxygen demand had not been investigated. The installation of balance tanks with regulated outflow was one of the standard methods employed to deal with the problem.

Mr. Pettett discussed at greater length the problem of estimating cyanides and agreed that the phenolphthalein method had to be used carefully as it was not specific and the reagent was unstable. Their choice of method was, of course, partly influenced by equipment available.

Mr. Lockett agreed with the speaker that the real solution lay in co-operation between sewage works managers and users of cyanides. He mentioned the risks to sewage workers and stated that deaths had been caused by concentrations of 10 p.p.m.

More Soap.—Some improvement in U.K. supplies of inedible oils and fats is reflected in the announcement by the Ministry of Food this week that the soap ration is to be increased as from January 30 from six to seven rations in each eight-week period. Soap consumption on the new basis is regarded as being 70 per cent of pre-war use.

Heightened Request for Chemical Materials

Production and Use in September and October

A GENERAL rise in production and improvement in the quantity of stocks are the satisfactory results shown in the figures of basic chemicals and non-ferrous metals for September and October, in the *Monthly Digest of Statistics* (No. 35, November, 1948), from which the table below has been compiled.

The number of persons employed in the

chemicals, coke-ovens and by-product works, in September, was 242,300, showing a slight increase over the previous month

Consumption of most commodities is also higher than in the same period last year, and this tendency is shown most consistently in the figures relating to manufactured fertilisers and fertiliser materials.

	September, 1948			September, 1947		
	Production	Consumption	Stocks	Production	Consumption	Stocks
Sulphuric acid	131.3*	—	59.6*	121.7	127.0*	54.5*
Sulphur	122.7†	23.4*	72.5*	—	21.3*	60.9*
Pyrites	—	19.1*	68.0*	—	17.6*	75.0*
Spent oxide	—	16.7*	162.9*	—	15.7*	158.9*
Molasses	8.1	26.8‡	197.5	6.8	27.5†	120.1*
Industrial alcohol (mil. bulk gal.)	1.87	2.11	9.43	1.96	2.28	5.48
Superphosphates	87.1	92.2	81.8	77.0	82.2	156.2
Compound fertiliser	151.2	126.2	198.1	126.2	109.3	158.4
Liming materials	—	367.6	—	—	327.1	—
Ammonia	—	6.58	5.44	—	5.92‡	4.22
Phosphate rock (agricultural)	—	74.3	166.9	—	66.7	129.5
Phosphate rock (industrial)	—	6.17	26.3	—	5.22	39.2
Virgin aluminium	2.49	15.3	—	2.21	14.0	—
Magnesium	0.34	0.43	—	0.11	0.37	—
Virgin copper	—	31.7	123.2	—	31.1	96.3
Virgin zinc	—	20.0	55.7	—	19.0	33.8
Refined lead	—	21.4	18.6	—	19.4	39.0
Tin	—	2.3	16.6	—	2.45	15.5
Zinc concentrates	—	15.2	81.0	—	14.0	70.0
Pig iron	183.0*	—	281.0*	161.0*	—	256.0*
Steel ingots and castings (including alloys)	313.0*	—	—	288.0*	—	—
Rubber :						
Waste collected	0.09	0.55	6.7	0.03	0.95	48.3
Reclaimed	0.52	0.53	3.81	0.47	0.58	4.37
Natural	—	4.08	63.4§	—	4.50	145.6
Synthetic	—	0.05	2.13	—	0.05	2.37

* October. † Distilling only. ‡ August. § 5 weeks. § Figures after July, 1948, exclude government stocks.

NEW STEEL RECORD

PRODUCTION of steel in November reached a new record level, the average weekly output for the month being 303,000 tons, which is equivalent to an annual rate of 15,756,000 tons.

The increased output was greatly helped by a high rate of scrap delivery and an expansion of pig-iron production, which amounted to 9,636,000 tons in November, compared with 9,525,000 tons in October, and 8,627,000 tons a year ago.

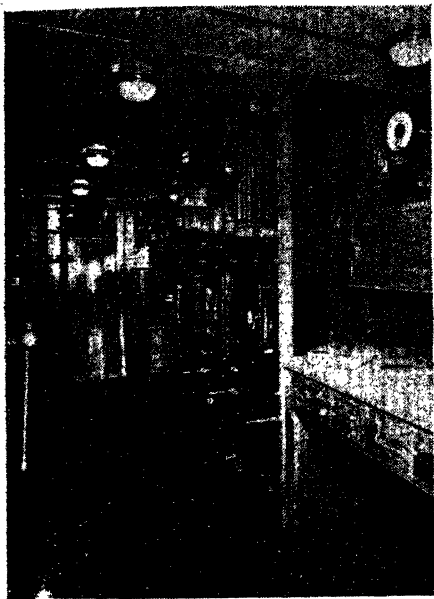
To have exceeded an average weekly production of 300,000 tons is a landmark in the expansion of the industry, and the excellent November figures are particularly welcome, in view of the anticipated seasonal decline over the Christmas period.

GOVERNMENT PURCHASES

IN a written answer to Mr. Lennox-Boyd as to the quantity and value of goods bought in bulk from overseas by Government departments in 1947, the President of the Board of Trade included the following:—Materials for fertilisers and for the manufacture of sulphuric acid 1,884,671 tons, value £8,804,344; chemicals 493,440 tons (£6,370,029); lead 196,000 tons (£13,702,250); zinc 141,000 tons (£8,268,000); copper (blister and electrolytic) 303,500 tons (£32,017,300); tin ore, tin content 9180 tons (£3,635,160); virgin aluminium 104,817 tons (£6,813,105); pig-iron 11,500 tons (£114,000); steel 375,000 tons (£7,339,000).

Technical Aid to Promote Fuel Economy

Ministry's Mobile Research Unit



View of the interior of the Fuel Ministry's mobile heat and power testing unit, showing temperature indicators and recorders

SO that fuel consumers in industry may have readier access to the instrumentation and measurement methods of improving fuel efficiency, the Ministry of Fuel has inaugurated a mobile testing unit service equipped with an extensive range of indicating and recording instruments. The unit, part of the Ministry's fuel advisory service, will be available to visit works in any part of the country to assist works managements in obtaining, free of charge, full information regarding process heat requirements and maximum fuel conservation. No call will be made on works staffs, and the unit's team has a full equipment of its own tools, small and large.

The mobile unit's equipment is accommodated in an ex-R.A.F. Radar van specially built for the transport of delicate machinery over rough ground. The van has a floor space of 15 ft. by 8 ft. and is fitted with detachable aluminium instrument panels for use either in the van or outside.

Included is a 6-point temperature recorder which can be used on three ranges:

0-500°C., 0-1000°C. and 0-1600°C., two 2-point temperature recorders, a number of temperature indicators of various ranges with multi-point selector switches, a steam flow indicator, a CO₂ recorder and indicator, and two steam flow recorders—one using the normal mercury U-tube differential and the other an aneroid bellows type differential—both provided with three-range tubes to give full-scale deflection with three different flows.

A comprehensive range of orifice plates and carrier rings is carried covering pipe sizes up to 6-in. bore. A differential pressure recorder with a differential of 3 in. W.G. is available for recording gas flow. The equipment also includes pressure recorders with a variety of ranges from a few inches W.G. to 500 psi, recording and indicating draught gauges, a modified Orsat gas analysis outfit, a water testing outfit, a workshop potentiometer, a millivolt meter, a multi-range ammeter, a kW meter, a tachometer, a velometer, a surface pyrometer, a steam engine indicator and chemicals, reagents, etc.

The van is fitted with a fully equipped engineers' workshop and carries its own cable drums so that its switchboard may be coupled to a works' own supply for power purposes.

NORWAY'S URANIUM

NORWEGIAN uranium and heavy water, sufficient to supply that country's first atomic pile, are now being mined and processed in Norway. A statement by Gunnar Randers, research head of the Norwegian atomic project, says that uranium ore is now being mined at Evje in Setesdal, and is considered sufficient for Norway's preliminary experimental purposes.

Norsk Hydro, the Norwegian electrochemical firm, whose facilities the Nazis seized for the manufacture of heavy water during World War II, is co-operating with the State in this project, and sufficient quantities of the liquid are assured. Norway's atomic centre is now under construction at Kjeller, near Oslo.

Radioactive isotopes are now being received from the U.S.A. and the United Kingdom, but training of atomic scientists and technicians has been retarded by delays in deliveries of research materials.

COMBINED MANUFACTURE OF SULPHURIC AND NITRIC ACIDS

Developments of the Kachkaroff-Matignon Process

IN a paper read in the 8th Section of the Brussels Congress of Applied Chemistry (September), F. Salsas-Serra expanded his previous contributions on the combined manufacture of nitric and sulphuric acids, describing further improvements in the Kachkaroff or Kachkaroff-Matignon (K.M.) plant (cf. *Chim et Ind.* 1947, 58, 433-438).

Higher Concentration

Briefly, the principal development has been an improved water balance in the system, so that the two acids may be obtained at the maximum concentrations, and the water introduced into cycle is reduced to a minimum. The plant also has been simplified in other ways.

In his earlier papers, Salsas-Serra has described in some detail the evolution of the K.M. process, and the erection of a plant at Vado-Ligure (by the Soc. Azogeno) with a daily capacity of 40 tons sulphuric and 20 tons nitric acid, in which remarkable economies in plant, material, and power were claimed. He also included several improvements in plant operation and design as a result of the experience gained at Vado; and reviewed the basic principles on which Kachkaroff and Matignon had originally worked, and which should still form the foundation of future development.

By reacting a mixture of SO_2 and nitrous vapours from ammonia combustion it is possible very considerably to intensify formation of both nitric and sulphuric acid. The N_2O_2 of the nitrous vapours is easily converted into nitrosyl sulphate, and this latter in turn is readily decomposed to yield the required concentrated nitrogen oxides. These may be condensed to nitric acid of about 65 per cent strength by simple water absorption—which, owing to high concentration of the oxides, may be quickly done—or by solution or mixture of the liquefied nitrogen oxides in the nitric acid.

The improved process is covered by French patents Nos. 845,272 and 877,540, the former dating back to 1938 and the other to Italian priority of June 28, 1939. Another French patent application was lodged by Salsas-Deplace on June 4, 1945.

The original process for the combined production of the two acids, which Salsas-Serra has now elaborated, was originally described by Pierre Kachkaroff, who dis-

cussed the general considerations on which the method is based.

He recalled that the manufacture of sulphuric and of nitric acid have evolved independently without any serious attempt to utilise points of similarity; and further, despite many improvements in both processes since the first world war, they are still not so good as they ought to be.

The manufacture of nitric acid based on condensation of relatively weak nitrous vapours from ammonia oxidation requires either enormous absorption space or use of high pressure, and then only an acid of comparatively low concentration is obtained. Supplementary, old, and costly operations of concentration by means of sulphuric acid or liquefaction in the first place of the weak nitrous vapours are needed.

Since many firms manufacture both acids, and there are, moreover, many points of similarity in the methods used, the importance of a combined method for both is readily apparent. It is known that nitric acid production becomes a simple matter where concentrated oxides of nitrogen are used, and it is therefore rational to study the possibility of obtaining such concentrated oxides from the relatively weak oxides resulting from ammonia oxidation.

Although the conversion of NO into HNO_3 is slow and may indeed proceed to infinity, the transformation, on the other hand, of NO into N_2O_2 or its equivalent, $\text{NO}\cdot\text{NO}_2$, is very rapid. It is therefore necessary to have an intermediate and unstable product when starting with N_2O_2 . Decomposition of the latter will yield concentrated oxides of nitrogen up to 100 per cent; and the conversion of these oxides to yield 98-100 per cent of nitric acid is not difficult.

Sulphate and Oxide Yields

By reacting a mixture of sulphur dioxide and nitrous vapours resulting from ammonia oxidation, it is possible very considerably to intensify the process of formation of sulphuric acid and nitric acid. The N_2O_2 of the weak nitrous vapours is easily converted into nitrosyl sulphate, and this in turn is readily decomposed to yield the required concentrated nitrogen oxides.

These may be condensed to nitric acid of about 65 per cent strength by simple aqueous absorption—which, owing to high concentration of the oxides may be done

quickly—or by solution or mixture of the liquefied nitrogen oxides in the nitric acid.

Alternatively, concentrated nitric acid may be obtained by treating with oxygen under pressure the nitrogen oxides mixed with or dissolved in 65 per cent nitric acid. The dehydrating power of nitrosyl sulphate in sulphuric acid solution is used to ensure a partial or total distillation of the weak nitric acid.

The K.M. process is shown diagrammatically in Fig. 1. The nitrous vapours from the ammonia burner (1) are cooled, with recovery of the heat, in a boiler (2) which supplies steam to the denitrating column, cooling being completed in a refrigerator (3). The sulphur dioxide from a source such as a pyrites burner, passes into the Glover tower (4) where denitration of the sulphuric acid is completed to yield 78 per cent acid.

The sulphurous and nitrous gases pass together into the absorption tower or towers (5) where they come into intimate contact with the nitro-sulphuric acid, and where oxidation of sulphur dioxide and absorption of the nitrogen oxides are completed. The residual gases, after passing through a filter (6), which may also serve as a small Gay-Lussac tower, are evacuated to the atmosphere.

The nitrosyl sulphate solution produced in (5) is almost completely denitrified in a column (7) by the steam coming from the boiler (2) and ultimately also by dilution due to introduction of weak nitric acid produced in the absorption chamber (9). The nitrous gases of 100 per cent concentration, highly oxidised, coming from the column (7)—after condensation of the concentrated nitric acid vapours to 98 per cent HNO_3 in a refrigerator (8)—are introduced, mixed with the requisite amount of air into the nitric absorption system (9) where, in a very limited space, they are transformed into 65 per cent nitric acid which may, wholly or in part, be concentrated to 98 per cent strength in the column (7).

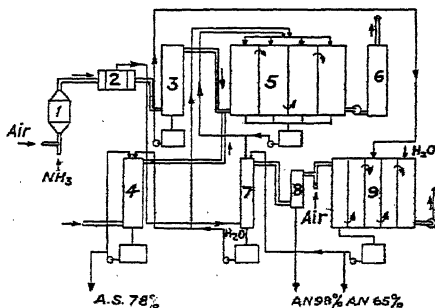


Fig. 1.

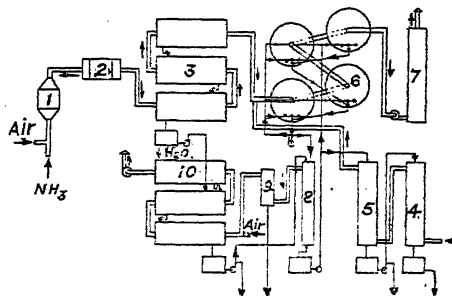


Fig. 2.

Such was the earlier type of plant, as erected at Vado-Ligure, but the experience gained there has suggested, according to Salsas-Serra, many important improvements which are of both theoretical and practical interest.

It has been found that the principal reactions are intensified or stimulated to such an extent that absorption, for example, may be accomplished in much simpler and better designed plant. The new absorption towers may be plain cylinders provided with special liquid dispersers or sprayers of high speed and capacity; and, since the *modus operandi* of absorption is analogous to cooling, the towers may also be used as refrigerants.

The absorption vessels are arranged in cascade, the lower parts of each being used as receivers. By this means the apparatus required is greatly simplified, and no special refrigerants or receivers are needed, with consequent reduction also in piping and connections.

The improved design of plant is shown in Fig. 2 where the cooler for the nitrous vapours is replaced by the first nitric absorption vessel (3), comprising several Kachkaroff refrigerant-absorbers arranged in cascade. The nitric acid produced—which in some cases may be concentrated up to 50 per cent to represent more than half the total production of nitric acid—is conveyed to the appropriate part of the last nitric absorption tower (10), also consisting of several Kachkaroff cylinders. The Glover tower of Fig. 1 is replaced by two towers, of which the first (4), utilises the sensible heat of the sulphur dioxide to concentrate, wholly or in part, the sulphuric acid up to 90 per cent. The second (5) is intended for completely denitrifying the acid produced in the absorption system (6), after passing through the preliminary denitrifier (8). This system (6) also comprises several cylindrical absorbers, and the circulating acid from the lowest cylinder,

after cooling, is re-conveyed into all the cylinders.

Operation of the Vado-Ligure plant has shown conclusively that lead may be replaced in practically all parts by cast iron or steel, with considerable economy in cost.

Practical experience has also shown that water equilibrium or balance during acid manufacture requires that the ratio between production, P_1 , of sulphuric and, P_2 , of nitric acid should not fall below certain limits. Thus, with sulphuric acid of strength 78-80 per cent and nitric acid of 64-66 per cent, the ratio P_1/P_2 should be ≥ 2 . If the sulphuric acid remains at the same concentration, while that of the nitric acid is raised to 96-98 per cent, the ratio should be $P_1/P_2 \geq 3.5$.

Wartime Patent

To increase acid concentration and reduce the P_1/P_2 ratio, Kachkaroff and the author devised various improvements forming the subject matter of a number of earlier patents.

In 1939-40, Kachkaroff was approached by a foreign firm who wished to produce nitric acid at a concentration above the asotropic, 70-75 per cent, together with a minimum production of sulphuric acid. On January 28, 1941, he lodged application for a French patent which was subsequently obtained under No. 877,540, with priority in Italy on application in that country dated June 28, 1939. By this time the inventor had apparently completed plans for a first installation to produce 7 tons N_2O_4 and 19 tons of 70 per cent sulphuric acid—presumably per day. But war conditions and Kachkaroff's death in 1943 prevented complete realisation of these plans, although the foreign company already mentioned has up to the present had an option for exclusive operation of the process in its own country; but at the time of Salsas-Serra's second paper (September, 1946) this had presumably not been exercised.

The principal patented process described above, with the new elaborations, may be regarded as an improved K.M. process. The primary features may be summarised as follows:

(a) The hot nitrous vapours are rapidly cooled and the water vapour condensed in the form of very dilute nitric acid of 1-4 per cent.

(b) In a first nitric absorption the conversion of 10-80 per cent of the nitrogen oxides into nitric acid of about 55 per cent strength is achieved.

(c) The remaining nitrous vapours are absorbed by sulphuric acid of 75-95 per cent strength in the presence of sulphur dioxide, the distribution of which in the system is suitably controlled in order to ensure at each

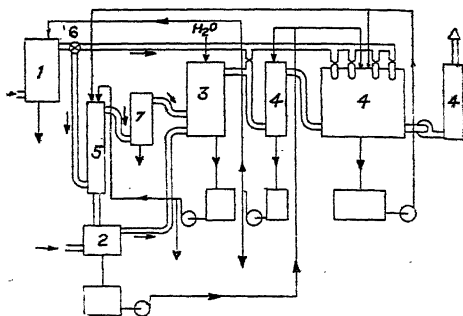


Fig. 3.

point a slight excess of free SO_2 . This feature also appears in the Salsas Techno-Chimie patent of October 27, 1938—Process for the combined production of nitric and sulphuric acids—French patent No. 845,272.

(d) The nitrogen oxides set free during denitrification, consisting mainly of the peroxide, are liquefied and treated separately with dilute nitric acid and formed with oxygen for production of concentrated nitric acid.

The author's own ideas are embodied in the French patent (845,272) mentioned and in the Salsas-Delplace French application dated June 4, 1945, and have been practically applied in plants being erected in France. These ideas and patent features are illustrated by reference to Fig. 3.

The Process

The gases containing sulphur dioxide are introduced into vessel (1) where they are partially oxidised into the trioxide and thence into oleum. The nitrous gases, after concentration in the boiler (2) and the dilute sulphuric acid from the denitrifier (5) pass into the one nitric absorber (3), where they are partially converted into dilute nitric acid (50-55 per cent).

The residual nitrous and sulphurous gases pass to the sulphuric acid making part of the plant (4), where the acid produced is completely denitrified and more or less complete solution is formed of the nitrosyl-sulphuric acid denitrated in the column (5). The sulphurous gases may be introduced into different parts of apparatus (4) in order to control the rapid and total absorption of the nitrogen oxides.

The concentrated nitric acid vapours are condensed in the refrigerant (7) and the uncondensed vapours pass into the nitric absorber (3). By this method sulphuric acid of concentration 20 per cent oleum together with 96-98 per cent nitric acid may

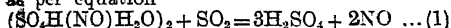
be obtained, and the ratio P_1/P_2 may be reduced to unity.

The author's own summary of basic principles or theoretical considerations enunciated by Kachkaroff may be briefly represented as follows:

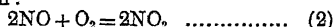
1. It is believed that the reaction by which sulphuric acid is formed takes place entirely in the liquid phase, and that it depends on absorption of sulphur dioxide and on the release of the nitric oxide formed; that is to say, on the diffusion of sulphur dioxide molecules and on the separation of the liquid and gaseous phase by the nitric oxide. We have here, then, a phenomenon in every way analogous to that of heat exchange in an exchanger: an analogy which should be fruitful of practical results.

In the production of sulphuric acid there are three stages:

(a) Formation of H_2SO_4 in liquid phase as per equation



(b) Oxidation of NO in gaseous phase, as per equation:



(c) Formation of nitrosyl sulphate in liquid phase by absorption into the sulphuric acid molecule of NO and NO_2 in equimolecular proportions corresponding to N_2O_4 .

Formula (1) is bi-molecular, and according to Kachkaroff has been confirmed by laboratory tests. He also worked out equations for speed of reaction, assuming a practically constant concentration of N_2O_4 in the K.M. process. From these equations it is concluded that:—

(i) the sulphur dioxide fraction absorbed will be constant and independent of the initial SO_2 content;

(ii) production capacity will be proportional to this content.

Industrial Experience

Practical experience on an industrial scale is said to have confirmed in a remarkable manner the theoretical principles set forth; and in an apparatus with five towers or compartments, sulphuric acid production in normal operation is approximately as follows:

1st compartment	80% of total
2nd "	16% "
3rd "	3.2% "
4th "	0.7% "
5th "	0.1% "

There is practically no sulphur dioxide coming from the last compartment.

2. Oxidation of the NO is slow and partial, and Kachkaroff was of opinion that nitrosyl sulphuric acid is formed chiefly at the expense of NO which is re-oxidised in the reaction zone; for the NO which passes this zone is only oxidised very slowly owing to dilution in the gas mixture.

It is therefore necessary to increase the proportion of N_2O_4 to be recovered in the reaction zone, and to this end it is accordingly essential to increase oxygen diffusion in the gaseous envelope surrounding the liquid; and also intensify sulphuric acid formation by displacing or removing it at the head of the system, because the NO produced is very concentrated, is therefore oxidised immediately, and therefore also absorption is very complete and rapid.

Effects Compared

Here again, practical experience has confirmed Kachkaroff's ideas. In the first compartment where 80 per cent of the SO_2 had been oxidised, at least 60 per cent of the NO set free has been absorbed after oxidation.

3. In applying the equation obtained by Kachkaroff for determining the total period required for transformation of 99 per cent of the SO_2 in presence of n molecules of N_2O_4 per molecule of SO_2 , the following figures are obtained:

TABLE I

%	Transformation period for 99% SO_2	
	With recovery of N_2O_4	Without recovery of N_2O_4
0.2	10	14.35
0.4	5	5.90
0.6	3.33	3.71
0.8	2.5	2.70
1	2	2.19
2	1	1.08
5	0.4	0.45
10	0.2	0.21
25	0.08	0.08

(The time unit is not specified).

It is apparent that the most favourable conditions for sulphuric acid formation will correspond to the presence of at least 5 molecules N_2O_4 per molecule of SO_2 . This relation holds good in the K.M. process.

Sugar from Wood

The Puukemia Company of Uleaborg, Finland, has for some time been carrying out experiments to produce sugar from wood. This work is now reported to have reached a stage where actual production can commence on a small scale, probably in February or March of next year. Output will aggregate about 400 to 500 kilogrammes a day and the product, which is stated to be similar to glucose, is white and tastes well. Price is reported to be about equal to that of domestic beet sugar. Machinery for this factory, which is said to be the only one of its kind, has been manufactured in Finland.

CERTIFIED SCIENTIFIC GLASSWARE

Welsh Organisation for High Quality and Output

A NEW stage has been reached in the prolonged struggle of the British scientific glassware industry to create for itself an unassailable position among world competitors on a basis of quantity production—as well as of quality, in which respect home production has for many years enjoyed a very high reputation.

One new factor in the operations, which were initiated in the 1914 war and have continued with varying fortunes ever since, is the very enterprising policy being put into effect at the rapidly expanding wartime factory (opened in 1941) of H. J. Elliott, Ltd., on the Treforest Trading Estate, near Pontypridd, Glamorgan. The objects of this are twofold: to increase the rate of production, principally of volumetric laboratory glassware, lampblown apparatus and chemical thermometers by well-planned adaptation of bulk production principles under carefully controlled conditions; and the introduction of special characteristics indicative of defined high standards of accuracy and quality of workmanship.

Augmented Supplies

With some 400 skilled workers, a highly developed works training scheme to maintain the supply of recruits and completed plans in hand for a substantial extension of existing manufacturing space, the Treforest enterprise would appear to be one of the most promising attempts to relieve the long-standing shortage of high-grade chemical glassware and sustain a steadily increasing export trade.

The keynote of the present expanding policy is the introduction of two new branded types of glassware, the E-Mil Green-Line and E-Mil Gold-Line, distinguished by the replacement of the white graduations of conventional types of apparatus by green and gold respectively. These graduations are in permanent fused enamel, chemically resistant to anything which does not attack the glass itself; and the gold, in particular, seems to represent an important improvement in visibility. This is particularly apparent in bad lighting in which white-filled etchings would be almost impossible to distinguish. The difficulties in reading associated with light refraction complicated by the meniscus of the fluid are very noticeably reduced.

The significance of the individual colouring, apart from the considerable practical benefits of the departure from the orthodox, is the special standards of accuracy, etc.,

which it represents. The Green-Line apparatus is all either (1) certified by the National Physical Laboratory to conform with its Class A standard of accuracy; or (2) bears an E-Mil works certification that it conforms with NPL Class A tolerance of accuracy.

The other special quality range of glassware, Gold-Line, is guaranteed to be within the NPL Class B limits of accuracy.

Reliability

The merits of such a certification system are fairly conspicuous, and the facility of being able to put into use guaranteed instruments without first checking volumetric and similar accuracies is not the least. The procedure by which this result has been secured without detriment to the very high rate of output reflects a notable achievement in works planning and organisation of operations.

An innovation associated with the new flasks and cylinders is the provision of plastic stoppers, which are highly resistant to chemical action, interchangeable and, while they form a perfect seal, they cannot jam. They are, of course, virtually unbreakable and may save the vessel from breaking when overturned.

As an exercise in organisation the Treforest works is exemplary, as it requires to be to permit the combination of an inspection and test on the completion of every operation in the course of manufacture with rapid handling of material, such as thermometer tubing or flask blanks, from the glass stores to the annealing shop and thence to the final volumetric tests.

Further Safeguard

In the production of Green-Line apparatus certification is very little less exacting than the processes of manufacture: All such apparatus calibrated for delivery is gravimetrically tested. Sub-divided apparatus is certified at five points, avoiding wherever possible original points of calibration. Each point tested is then independently checked by another skilled operator, a third cross-checks the results, and only when these agree is the apparatus passed.

Generally speaking, all apparatus calibrated for content is volumetrically tested and checked in the same way.

The magnitude of this aspect of the work is very evident when it is realised that some pieces undergo 50 inspections before completion.

(Continued on page 788)



MAKING AND TESTING

1. A highly skilled craftsman engaged in one of the more delicate operations at Treforest; 2. Calibrating Gold-Line volumetric apparatus; 3. Testing high-range thermometers; 4. Measuring the wall thickness of a butyrometer; 5. one of several batteries of twin automatic burette dividers at the E-mil works



Large-Scale Glass Plants

Interesting Developments in Chemical Equipment

THE wide range of methods by which glass is employed for chemical industrial purposes is significantly increasing. Where formerly it was apt to be regarded as a fragile material for indoor laboratory work, it is to-day being used more and more for large-scale chemical plant both indoors and externally.

The glass mainly used for this large-scale work is a heat resisting borosilicate glass. The illustrations on this page give some idea of the relatively large size of such glass chemical equipment, although they do not represent the maximum.

100-Litre Vessel

The ebullition unit consists of a 100-litre vessel with 6 in. diameter boiler 5 sq. ft. heating surface arranged for circulatory heating. This scheme prevents bumping under vacuum and reduces the time of contact between liquid and heating coils.

The scrubbing tower for cleansing gases is an assembly incorporating standard pipe line and heat exchanger units. The coils in these units behave as packed columns capable of being operated at controlled temperature.

Certified Scientific Glassware

(Continued from page 786)

A high degree of mechanisation has contributed very largely to make the performance of a multitude of operations economically possible. Outstanding evidences of this are the speed with which highly proficient women operators inscribe graduated stemmed pieces with the Pantograph machine or, in the hand-rack section, control the incision in the waxed surface of the glass of the "all-round" graduations required for NPL specifications. The latter phase of the work involves some 10 separate operations and much ingenuity has been devoted to solving stubborn timing problems by the design of multiple-process machines. Thermometer production, for example, complicated at the start by the detailed work of cutting the tubing and gauging the bore within very fine limits—1/80 mm. in some cases—is speeded by the use of multiple dividing machines, some incising graduations on two tubes simultaneously and the most prolific operating 10 cutting needles at one time with perfect accuracy.

The mechanisation of extremely delicate operations clearly requires an unusually high degree of skill and responsibility on the part of operators, which the company does well to foster.



Scrubbing tower (left) and an ebullition unit, examples of the variety of large-scale plant in use to-day. (Photographs by courtesy of Quickfit and Quartz, Ltd. and Imperial Chemical Industries, Ltd.)

BELGIAN CHEMICAL PROSPECTS

Rapid Academic and Industrial Advances

THE most comprehensive study since 1938 of the capacity, growth and prospects of Belgian and Belgian Colonial chemical industries was presented at the recent 21st Congress of Industrial Chemistry in Brussels. It was derived from more than one source, and principally from the discussion by Prof. Badhuin, of Louvain University, of the rôle of chemical industry in Belgium and the report specially prepared by the Belgian Federation of Chemical Industries.

Universities' Contribution

These were dealt with very fully in *Chim. et Ind.* (September, 1948), in which other reviews associated with the congress include a description of instruction in Belgian universities, the restoration in Liège University, with particular reference to the magnificent Val-Benoit laboratories, and chemical industry in the Belgian Congo.

Prof. G. Batt, who deals with the restoration, emphasises the prominent part played by Liège, despite the devastation of war, in the remarkable post-war recovery of Belgium; its 1947 Congress and Exhibition, the progress made under enlightened government support through the FNRS (national foundations for scientific research) and IRSIA (institute for the encouragement of scientific research in industry and agriculture); and the new enterprise in underground gasification.

Prof. W. L. de Keyser, describing courses of instruction in industrial chemistry in Belgian universities, said that Belgian universities are very individualistic and their chemical curricula differ widely. The position, too, in regard to degrees has changed since 1930, when two new grades of Ingénieur Civil (chemist and metallurgist) were introduced.

In the survey of Belgian chemical industry contributed by the Belgian Federation of Chemical Industries the remarkable recovery of the past year or two is shown by the following record of chemical export totals:—

	Exports in 1,000 tons	% of total	Value in mill. frs.
Average, 1936-38	1414.6	6.1	1815.86
1946	567.7	7.6	2720.26
1947	1230.2	9.6	6466.7
First half, 1948	796.72	10.9	3558.36

In 1947, chemical commodities represented 10.5 per cent of total exports, some 50-60 per cent of total output being disposed of overseas.

Despite the good showing so far for 1948, there has been slackening

in export trade in some directions, which is attributed to the financial difficulties of many countries, enforcing limitation of imports. It is hoped that the Marshall Plan will relieve this situation.

In the inorganic or mineral chemistry group, sulphuric acid is made by 24 Belgian firms, of which eight are equipped for concentrated contact acid and 20 per cent oleum. One manufactures sulphochlorhydrin. Sodium carbonate and sulphate are made on a large scale, stimulated by the highly developed Belgian glass industries; also hydrochloric acid, much of which is exported. Other products extensively manufactured are copper sulphate and many other metal salts, peroxides and salts, and calcium carbide. Some calcium carbide is exported and one firm uses its entire output for cyanamide.

In the field of organic chemicals, large supplies of coal tar and by-products of the gas and coke industries sustain a high level of production. These and metallurgical coke are in vigorous demand. Phenol and cresols are increasingly required for synthetic resins and plastics; and at least one firm has been compelled to synthesise phenol to meet its requirements. This undertaking hopes to export some of its synthetic phenol this year.

Acetylene Derivatives

An interesting development is that of acetylene derivatives, in the development of which Belgian chemical firms are determined not to lag behind other countries. Impressive progress is recorded in the production of dyes, pharmaceuticals, textile and tanning chemicals.

Paints, pigments, varnishes and printing inks also show remarkable progress. Some of the pigments, such as zinc white, lithopone, etc., are being produced almost entirely for export, some 20 per cent only being retained. The same may be said of artists' colours and of oils, fats, soaps and glycerine, greatly stimulated by plentiful supplies from the Belgian Congo.

Supporting the traditionally important vegetable oil industry of the Belgian Congo, mining and chemical industries derived from it are achieving a greatly heightened value. One of the largest chemical firms, Sogechim, of Jadotville, which manufactures sulphuric acid from Texas sulphur, now employs sulphur residues from Congo mining, which include zinc sulphate and

(Continued at foot of following page)

New Uses for Herring Oil

Successful Scottish Experimental Extraction

A NUMBER of developments undertaken by the Herring Industry Board were revealed by the chairman, Sir Frederick Bell, at a Press conference in Edinburgh recently.

Steps had been taken towards establishing herring reduction plants at suitable places, and the first had been installed at Wick. Here some excellent quality oil for margarine had been produced from herring surplus to market requirements. It was hoped to establish a full-scale reduction plant at Stornoway next summer.

It was the Board's intention, Sir Henry said, to make arrangements so that there would be no dumping of herring in future.

The outstanding fact was that fishermen were more ready to accept the residual outlet for otherwise unwanted herring in the form of oil and meal.

Sir Frederick also referred to experiments in the machine-gutting of herring to relieve shortage of skilled labour and to the canning factory constructed for experimental purposes at Port Glasgow.

Further experimental work is in progress in Scotland to implement the progress already made by the Herring Industry Board in the extraction of odourless oil from herring. This aims at utilising the dissolved protein residue left after the oil

has been extracted. This residue has been dried with the assistance of the Scottish Milk Marketing Board, by use of the equipment normally used for the drying of milk extract.

Cattle Feed

A very satisfactory protein powder is stated to have been produced, and it has been used as the basis for further experimental work. This has been carried on at the Rowatt Research Institute, Aberdeen, with the intention of producing a compressed food extract and animal feeding stuffs. At present it has been demonstrated that the protein will make an excellent animal food and some considerable expansion of this work is expected. It is also likely that further research will be done to develop the extract in the form of compressed food extract, possibly in cube form.

Board officials have indicated that the main bulk of output from the Wick factory would be devoted to human consumption in the margarine-from-herring scheme and that relatively little of the production would be given for animal feeding. That situation is now apparently under review and prospects of animal feeding stuffs from herring appear to be materially improved.

BELGIAN CHEMICAL PROSPECTS

(Continued from previous page)

cadmium. Its total annual capacity to-day is 3500 tons of acid. This firm also hydrolyses palm, groundnut and maize oils, the fatty acids being used for ore flotation by the Union Minière du Haut Katanga and others, and the glycerine is sold. Sodium chlorate for use in explosives, hydrochloric acid, caustic soda, copper sulphate, and ferric chlorosulphate are numbered among the firm's products.

While the Union Minière has a water electrolysis plant for oxygen production, nothing is said to indicate what use is made of the hydrogen, although it is most probably used for fat-hardening. Congokina is increasing its output of quinine bark to 1000 tons annually.

There are 24 oil mills in the Congo, having an annual production of about 120,000 tons of palm oil and 30,000 tons other oil. Exports in 1947 were 103,220 tons. Among the leading firms in this industry are the Lever companies: H.C.B. and Huilever. Other companies are the

Soc. de Colonisation Agric. du Mayumbe (SCMA), the Co. Cotonnière Congolaise (Cotongo), and Les Huileries et Plantations du Kwango (HPK). Output of soap in 1946 was 21,000 tons from 36 factories; exports in 1947 were 8500 tons. Owing to urgent need to increase exports of all kinds, including palm products, the raw material position for soaps, etc., is at present somewhat difficult. It appears surprising that greater attention has not been given to the production for export of finished products rather than raw materials.

The country has large potential resources of hydro-electric power, and just recently three companies—Sydelco, Sydelstan, and Sydelral—were formed to develop water power of the Lower Congo, Stanleyville district, and Albertville. The Congo has enormous forest reserves of 120 million hectares, as well as unexploited mineral wealth. In Belgium itself possibilities in these and other directions are being constantly investigated, by the Colonial Ministry's research and intelligence departments, by the IRSIA, and others.

ACCELERATED OIL HARDENING

Bamag Patents New Hydrogenation Process

A SUBSTANTIALLY quicker method for the hydrogenation of unsaturated compounds, notably oils and fats, has been described in two new patents, Nos. 10784-5/48 (cognate). These, now open to public inspection, are in the name of Bamag, Ltd.

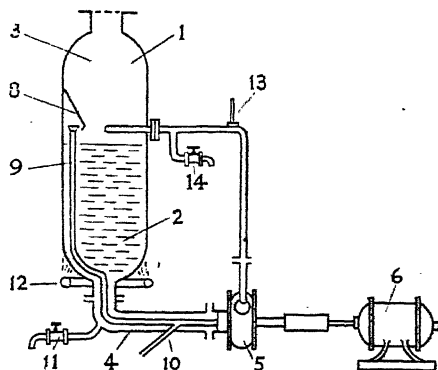
A powder catalyst is used, but is not specifically described. It is suspended in, or mixed with, the oil to be treated, and is circulated at high speed in an atmosphere of hydrogen, while being vigorously stirred.

Circulation may be by a centrifugal pump at high speed in closed circuit, as in the batch process shown in the accompanying diagram, or in a series of stages in cascade, as in the continuous process.

It has been found that (1) if the gas is introduced into the upper part of vessel after re-taking of hydrogen from it has ceased the reaction also practically ceases; (2) if retaking of hydrogen is resumed and entry of fresh gas is suppressed, the reaction is very good, and hydrogen from the upper part of the vessel is repeatedly and totally absorbed; (3) if, when retaking of hydrogen has been re-established, fresh gas is injected into the pump under constant pressure, the reaction is very good and particularly rapid, all the gas being absorbed. In the last two cases the pump is fed with hydrogen.

Material, on re-delivery into the upper part of the vessel, is broken up by impinging on a fixed surface or baffle in order to free hydrogen from it.

Circulation may be effected at least 60 times during the reaction and may be at the rate of several times per minute. Pressure may be up to 10 atmospheres.



The diagram shows the following: 1, pressure vessel capable of withstanding internal pressure $> 10 \text{ kg./cm}^2$; 2, mixture of oil and catalyst; 3, hydrogen atmosphere; 4, duct connecting the lower part of the vessel to the suction branch of the centrifugal pump 5, driven by motor 6. The duct (5-13) conveys centrifugal oil/catalyst mixture from the discharge branch of the pump to the upper part of the vessel; 8, deflector breaking the jet of oil entering from the duct; 9, is the duct priming itself (behind 8 and housed in duct 4), entering the central part of the pump and bringing hydrogen to this point; 10 is the duct branching from 9, serving to introduce the make-up hydrogen under pressure; 11 is the drain branch pipe; 12, the heating source; 13, a thermostat; and 14, the cock for taking samples.

A set-up for continuous cascade working is also shown in the specification.

NEW BRAZILIAN OILS

TWO oils capable of considerable future development are reported from Brazil, which is already the source of oiticica oil.

Panao (*Cuidoscolus Maragravii Polu*) a forest tree which is widely found in the states of Bahia, Esperito Santo, and Rio de Janeiro, is the origin of one of these. The tree bears nuts enclosed in a prickly bur resembling a chestnut, and the oil derived from the kernels is not only nutritive but can be used with distinct advantage in the manufacture of paints and varnishes.

Macuja or Macauba (*Acrocomia selocarpa*), a feather palm also found in Brazil and Paraguay, gives a generous oil yield of which the commercial potentialities have not been fully exploited.

CEYLON'S OIL FOR U.S.A.

THE U.S.A. was reported lately to have entered the market for Ceylon coconut oil. Import licences had been granted to private importers in the U.S.A. covering 6000 tons of coconut oil from Ceylon with the stipulation, however, that the licences lapse at the end of one month. American imports of Ceylon coconut oil during the past 10 years have been virtually nil. In 1938, for instance, the United States imported only three tons of coconut oil from Ceylon. The United States' requirements of all coconut oil products are normally supplied from the Philippines. In September 86,326 cwt. of copra and 154,826 cwt. of coconut oil were shipped from Ceylon to world markets.

EUROPEAN USE OF OILSEEDS

Partial Restoration of Principal Supplies

THE great disparity which still exists between the pre-war use of oilseeds by seven Northern European countries and what is currently available to them was brought prominently to mind by a paper contributed to the recent conference of the International Association of Seed Crushers. This, the most comprehensive that has lately been available, was presented by K. Kretschmar and is reproduced at length by *Oléagineux* (November, 1948: 518-522). The figures illustrate how small a proportion of European oil extracting is usefully employed. A comparison of pre-war and post-war figures reveals the following:—

Holland

Pre-war capacity of 1 million tons of oilseeds per annum was completely restored by 1947. Actual imports of oilseeds in 1938 and 1947 were (in 1000 tons):—

	1938	1947
Linseed	201.7	15.08
Groundnuts	154.8	6.5
Soya beans	105.2	7.3
Copra	49.5	141.2
Palm kernels	48.5	0.18
Sesame	6.3	0.6
Castor beans	1.5	1.1

Grand totals in the two years were 661.3 and 172.17. It is hoped that in 1948 the total will exceed 200,000 tons.

Belgium

Pre-war and post-war capacity was also 1 million tons. Imports (in 1000 tons) were these:—

	1938	1947
Groundnuts	87.9	17.4
Copra	23.3	0.5
Linseed	81.1	3.1
Palm kernels	29.3	55.4
Castor beans	10.6	2.7
Soya beans	21.8	—

Totals were: 259.2 and 91.2. For 1948 an import total of 100,000 tons is hoped for.

France

Pre-war capacity, now restored, was 1.6

million tons of oilseeds. Actual imports (in 1000 tons) were:—

	1938	1948
Groundnuts	742.0	178.3
Linseed	203.0	1.77
Soya beans	14.0	16.42
Palm kernels	88.0	64.76
Copra	143.0	124.0
Castor beans	20.0	5.5

Total imports of oilseeds and nuts in 1938 and 1947 were 1255 and 438.5. In 1947, home grown oilseeds amounted to 31,000 tons (half of which was colza); and a considerable amount of oilcake was imported for oil extraction. In 1948 it is expected that home grown colza alone will amount to 100,000 tons, and that imports, especially of groundnuts, palm kernels and copra, will exceed those of 1947.

Switzerland

Capacities in 1938, 62,500 tons, and in 1947, 65,000 tons. Total imports were respectively 58,700 and 47,000 tons, plus 7000 tons of home grown seed in 1947. Imports were mainly groundnuts and copra.

REVIVAL IN ITALY

PRODUCTION in Italy's chemical industry in September attained the highest figure since the war, showing 69 per cent of the level of 1939. The average monthly output for the first three quarters of the current year is 57.4 per cent, and if, as anticipated, the improvement is maintained, production for the twelve months will be slightly better than the 58 per cent of 1947.

Exports showed a general improvement, excepting paints and varnishes in which a slight decrease was recorded. The principal increases in the first three quarters of this year were (in tons): sulphur from 14,944 to 76,458; zinc ore, 54,884 to 67,340; mercury, 459 to 751; essential oils, etc., 392 to 416.

Scandinavia

						NORWAY		SWEDEN		DENMARK	
						1938	1947	1938	1947	1938	1946
						(in 1,000 tons)					
Capacities	...	...	...	...	...	120	130	200	200	400	400
Imports:—											
Copra	...	...	...	...	...	45	19.9	20.8*	20.2*		14.0
Soya beans	...	...	...	...	...	24	10.2	145.5	4.3	} 234	6.4
Groundnuts	...	...	...	...	...	11	5.4	5.3			
Sesame	...	...	...	...	...						
Sunflower seed	...	...	...	...	...						
Cotton seed	...	...	...	...	...					} 13.5	
Total imports:	...	...	...	...	...	102.0	38.7	180.6	24.7	263.2	21.5
Home-grown	...	...	...	...	...	—	—	—	28.2	(linseed)	8.6

* These figures include palm kernels.

CHEMICAL PROGRESS IN CEYLON

Belated Experiments to Recover Tar Products

From Our Own Correspondent

HOW wide is the scope for chemical plants and industrial development in some familiar departments in parts of S.E. Asia is recalled by the statement that in Colombo, Ceylon's Department of Industries has only lately begun to conduct experiments with waste tar obtained from the Colombo Gas Company with a view to exploring its economic possibilities by recovering the organic and inorganic chemicals it contains. In Ceylon, it is pointed out, the absence of suitable extraction plant has been the primary cause of these by-products being wasted in the past.

Dr. A. Lowe, principal research officer of the Department of Industries, however, is determined to explore the chemical wealth of the waste tar and is experimenting in a plant built for the purpose at the Department's research laboratory in Colombo. Some of the more obvious by-products that could be produced are disinfectants, wood preservatives, aspirin, alcohols, ammonium sulphate (fertilisers) and naphthalene, and then, after all the chemicals have been extracted the residual tar can still be used for roads. Imported tar, says Dr. Lowe, is devoid of these valuable chemicals.

The department has already worked out a process for recovering by-products from the distillate from coconut shell. These are available in the market in Ceylon as Dachinol and Woodgard (wood preservatives), woodnaphtha (the alcohol and acetone fraction used for fuel purposes and in the paint industry), etc.

* * *

Ceylon has natural resources for manufacturing soap and perfume on a scale large enough to capture the Eastern markets. This is the opinion of Mr. W. Kalupahana, a Sinhalese engineer in one of the largest factories in India manufacturing soap and perfume, and who is at present in Ceylon.

An essential ingredient for soap manufacture is coconut oil. Indian manufacturers import it from Ceylon. Another essential is caustic soda, and Ceylon has started a scheme for the production of this. With these, all that is required is a little enterprise and Ceylon "quality" soaps could command a formidable position in the market.

Referring to the manufacture of perfumes, hair lotions and creams, Mr. Kalupahana says that Indian manufacturers import the

two essentials for perfumes—citronella oil and cinnamon leaf oil—from Ceylon. Ceylon has also several varieties of flowers from which perfumes could be extracted.

"I make these observations," he adds, "because, if Indian firms can manufacture these things on a commercial basis, in spite of having to import several of their necessities, I do not see why Ceylon, possessing most of the raw materials, cannot turn out more of these items than she does at present."

* * *

When the *Mount Mansfield* left Colombo on her America-bound voyage recently, the event marked the resumption of direct trade relations between Ceylon and the U.S.A. after a lapse of more than 20 years. She carried a shipment of coconut oil, the first bulk shipment ever to have left Ceylon for the U.S.A. According to negotiations which have just been completed, the U.S. Government has indicated its willingness to permit the purchase, through commercial channels, of Ceylon coconut oil up to 6000 tons at a price very much more favourable than the U.K. Government's price of £89 per ton.

The International Emergency Food Committee does not control Ceylon's coconut oil and copra, the total output of which, until July this year, was under direct contract with the U.K. Government.

* * *

The question of tapping the iron ore deposits is also to be investigated. Large quantities of iron ore deposits are to be found in the Ratnapura district and in parts of the Uva Province in Ceylon.

The Government of Pakistan has also decided to set up a pilot plant for the manufacture of special alloy steels at an estimated cost of £100,000. The cost will be shared by the Central and Provincial Governments and Pakistan nationals, the Pakistan Government subscribing 61 per cent. The plant will be located at Wah, in West Punjab.

* * *

An Indian plastics delegation has been studying progress in the plastics industry in the U.K. and the U.S.A. and methods of producing and marketing, and collecting information useful to the development of the plastics industry in India. The delegation will, in December, visit Czechoslovakia, where the plastics industry has also grown in recent years.

American Chemical Notebook

From Our New York Correspondent

RESULTING from extensive research on chemical copolymers of styrene and alkyls, a new type of synthetic resin for fast-drying enamels was announced this week by the coating resins department of the American Cyanamid Company. Adapted for use in industrial finishes, the new Cycopol resin is said to be of pale colour, excellent toughness, and to offer good adhesion to metal surfaces, a high degree of durability, high gloss and good colour retention. Enamels made with the resin may be brushed or sprayed.

* * *

Attracting wide interest as an ingredient in rocket fuels, and in the manufacture of dyestuffs and pharmaceuticals, hydrazine is the subject of a report* newly issued by the Office of Technical Services, U.S. Department of Commerce in Washington. The 23-page review deals with the manufacture of hydrazine hydrate base rocket fuel at the Gersthofen plant of the Chemische Fabrik von Transche and Company in Germany. This plant has a capacity of 100 metric tons a month, using refinements of the Raschig reaction, involving the partial oxidation of ammonia by sodium hypochlorite. The report describes manufacturing technique; yields; safety precautions; plant equipment; health hazards to plant workers; physical properties of hydrazine hydrate; vapour pressure details and flow diagrams. Hydrazine hydrate was being manufactured both in the United States and abroad before the war. Research is now being sponsored by the Federal Government.

* * *

Dr. Eugene Ayres, chief chemist of the Gulf Research and Development Company, Pittsburgh, Pa., speaking on the subject of "Major Sources of Energy," before the annual meeting of the American Petroleum Institute in Chicago, predicted that the United States may well see the end of its present reserve of uranium in 30 years (1978), if the current rate of atomic bomb production is maintained. Atomic disintegration through fission has been regarded incorrectly as an inexhaustible source of energy, and annual production of uranium in the U.S.A. was said to be more than

one-thirtieth of the entire reserve. Unlike petroleum, there was little likelihood of extending the uranium reserve by large discoveries.

* * *

The first shipment of monazite sand to the Lindsay Light & Chemical Company, West Chicago, Illinois, for processing, marks the successful conclusion of two years' development work at McCall, Idaho, and it is expected that with further expansion this source will be sufficient to fulfill the United States' present needs for this ore. Monazite sand, important as the commercial origin of thorium which was formerly available only from India or Brazil, has also been found in Jacksonville, Florida, where the first commercial production is planned to begin in about six months.

* * *

The Engineering and Construction Division of the Koppers Company, Inc., has reached an agreement with Dr. Bronislaw Goldman, Pittsburgh consulting engineer, which will enable the company to produce the Goldman agitator for chemical or other industrial plant installations. The agitator, recently patented in America, works on an entirely new principle which is said to reduce materially the time required for mixing or washing of chemicals. The agitator is constructed to propel liquid to the sides of the tank and upward. At the top, the liquid is drawn to the centre where it is sucked through the hollow axis to which the agitating blades are attached. It is expelled from the bottom of this hollow axis to repeat the process. Several installations of the Goldman agitator are now being made.

* * *

Gum Tragacanth, Locust bean (*carob*) and Karaya can now be "dissolved" in a matter of minutes. This is the claim made for a new process developed by Glyco Products Company, Inc., of Brooklyn, New York, and Natrium, West Virginia. Known as "Aqualized" gums, the new products, now available in commercial quantities, are used in a number of industries for thickening, dispersing, emulsifying and coating. The former difficulty in producing dispersions easily or completely in cold water is said to have been overcome, and the usual boiling, alkali treatments or mixing with sugar, glycerine, glycols or alcohols are unnecessary. The physical properties of the gums or their solutions are not changed.

* "Production of Hydrazine Hydrate Base Rocket Fuel," No. PB. 93767, 75 cents per copy from the Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C.

IMPROVING MINERAL RECOVERY

Promising Uses of New Flotation Media

LARGE new reserves of minerals are, in effect, being created in the U.S.A. by the widened use of "sink-float" plants in which heavy-density liquids and mixtures are used to concentrate ores and clean coal. This is the view of Mr. John T. Sherman, mining engineer with the American Cyanamid Company, described to engineers at the recent 69th annual meeting of the American Society of Mechanical Engineers.

Flotation processes, which were highly efficient in separating coarsely crushed solids on the basis of specific gravity differences, had developed rapidly during the past few years and to-day were treating millions of tons of ores and coal each year. Because of low capital cost and cost of operation, such plants could be used to grade up sub-marginal ores to the point where they could be treated profitably.

Mr. Sherman pointed out that use of the force of gravity to separate valuable from worthless minerals was one of the oldest and cheapest methods of concentration. The gold miner's pan, sluice boxes, jigs, shaking tables and a host of other devices had been used to separate the heavy and the light constituents of an ore or raw coal.

Precise Separation

The mineral dressing engineer had known for many years that precise separation on the basis of specific gravity alone could be obtained by employing a liquid having a specific gravity the same as the gravity at which a separation was desired. The obstacle in applying this principle had been the lack of cheap liquids having the desired specific gravities.

Having been frustrated in developing a satisfactory heavy-liquid process, the mineral dressing engineer had sought to achieve the same results by simulating a heavy liquid. This could be done by mixing a fine, heavy solid with water.

While few solids known to-day possessed all the qualifications for the ideal medium solid, three had been found that fulfilled the requirements to a greater or less degree: ferrosilicon, galena, and magnetite. To-day, out of a total of 35 sink-float plants employing ferrosilicon or galena media, all but eight used ferrosilicon and two more were being converted to its use.

Ferrosilicon was cheaper and harder than galena, highly susceptible to recovery by magnetic separators and not subject to rusting. The successful use of ferrosilicon on iron ores led to its use in the concentra-

tion of a variety of metallic and non-metallic ores—lead-zinc, tin, garnet, fluor-spar, magnesite, barite, spodumene and diamond ground.

Galena was a naturally occurring lead ore. It was heavy, could be recovered by froth flotation and could be finely ground. It had the disadvantage of being so soft that it abraded rapidly and was subject to loss as slime. It was not cheap, especially at to-day's high lead prices.

A Stable Medium

Magnetite was highly magnetic, which facilitated its recovery, heavy enough to yield any gravity required in coal cleaning and was a fraction of the cost of ferrosilicon. It was somewhat easier to handle because of its lower specific gravity. It was more finely ground than the other medium solids and for this reason produced a more stable medium. The fine size also reduced wear on the equipment.

In addition to coal, magnetite could be used as a medium solid for the separation of other low gravity minerals such as gypsum, potash ores and concrete aggregate.

Concrete aggregate was treated in order to eliminate low gravity particles that weakened the concrete. If, as seemed probable, this attempt proved successful, it would make possible the use of local aggregates in construction work that had been rejected.

Labour requirements for special flotation plants were very low. The equipment was largely automatic and, apart from equipment maintenance, the operator had little to do except to take periodic samples of the medium to check the gravity.

High-Speed Working

Capacities were high, as the separation of materials took place in a few seconds. A unit equipped with a seven-foot diameter cone separatory vessel could treat more than 600 tons of feed in a 24-hour day.

Although commercial sink-float installations had been restricted to the treatment of material coarser than 10 to 14 mesh, pilot plant studies made at the mineral dressing laboratory of American Cyanamid Company indicated the possibility of making good gravity separations of particles as fine as 48 mesh in the case of ores, and as fine as 100 mesh in the case of coal, Mr. Sherman concluded

Personal

THE following officers and council were elected for the ensuing year at the 286th anniversary meeting of the Royal Society: SIR ROBERT ROBINSON, president; SIR THOMAS MERTON, treasurer; SIR EDWARD SALISBURY and PROF. D. BRUNT, secretaries; PROF. E. D. ADRIAN, foreign secretary. Other members of council: PROF. J. D. BERNEL, PROF. G. R. CAMERON, SIR JAMES CHADWICK, PROF. S. CHAPMAN, PROF. H. DAVENPORT, SIR FRANK ENGELDOW, PROF. W. E. GARNER, PROF. A. C. HARDY, DR. C. H. KELLAWAY, PROF. G. F. MARRIAN, SIR WILLIAM STANIER, DR. H. G. THORNTON, PROF. C. E. TILLEY, DR. A. E. TRUEMAN, PROF. S. ZUCKERMAN. SIR ALFRED EGERTON, having completed ten years as physical secretary, is succeeded by PROF. D. BRUNT.

DR. T. F. WEST has recently arrived in Melbourne to take up the position of director of the developmental division of Drug Houses of Australia, Ltd. Dr. West is a D.Ph. and D.Sc. of University College, London, and a Fellow of the Royal Institute of Chemistry. His research work in the chemical field has covered a wide range, with special application to essential oil constituents and insecticidal preparations. He was formerly assistant director of the Ontario Research Foundation and lecturer at Toronto University.

MR. E. J. BOORMAN has been appointed chief chemist of the Anglo-American Oil Co., Ltd. After several years' post-graduate research at the Imperial College of Science and Technology, he became a member of the Department of the Government Chemist where he was concerned with analytical, fiscal, and legal aspects of petroleum products. Since the war he has been head of the research group of Esso Development Co., Ltd.

MR. FREDERICK W. M. JAFFE, deputy public analyst of Bradford since 1941, has been recommended to the joint position of public analyst and official agricultural analyst for the city, and consulting chemist to all corporation departments, in succession to MR. F. W. RICHARDSON, who recently resigned.

PROF. S. G. WARD has relinquished the chair of chemical engineering at Birmingham University, to which he was appointed in 1946, to become professor of mining and director of the university's mining department.

Obituary

DR. FRANCIS HENRY SWINDEN CURD, aged 39, of Bramhall, Cheshire, one of the Imperial Chemical Industries' team of scientists at Manchester which discovered paludrine, the anti-malaria drug, died in Stockport Infirmary on December 2 from injuries received when two trains collided in fog near Stockport Station. Dr. Curd, a native of London, joined the staff of I.C.I. in 1933. He collaborated with Dr. F. L. Rose and Dr. D. G. Davey, in the discovery of paludrine, which has since been described by a leading medical authority as "one of the greatest medical discoveries of the last 100 years." The three scientists were all in their thirties, and were recently awarded the gold medal of the Society of Apothecaries—the highest honour the society can bestow.

The death has occurred of MR. WILLIAM MAIR, a prominent Scottish chemist and local historian, in his 81st year, at his home in Edinburgh. Mr. Mair was a life member of the Pharmaceutical Society and of the Chemical Society. In 1931 he was elected an honorary member of the American Pharmaceutical Association, of Washington, D.C. He was the author of "An Index of New Remedies" (1941), which was followed by a second and third series in 1943 and 1945, and this year he published "An Index of Modern Remedies." He also wrote a book on "Indigenous Drugs of India," and he made the first radiograph in India shortly after Prof. Röntgen had made his discovery of X-rays.

It is being recalled that the late DR. HENDRIK JOHANNES VAN DER BIJL, of Johannesburg, while working as a research chemist for the American Telephone and Telegraph Company and Western Electric, first stated the theory of the thermionic valve. Chairman of many business undertakings, and chancellor of Pretoria University since 1934, he visited England in 1946, when he declined an invitation to become the first chairman of the Iron and Steel Board.

Lecture Cancelled.—The final lecture in the series "The Atomic Age" being given under the auspices of the Sir Halley Stewart Trust was cancelled because the lecturer, Prof. D. W. Brogan, owing to strikes was unable to obtain a passage from America. The text, under the title "America as Atlas," will be published in the volume of the complete series.

Home News Items

Cold Room for University.—The installation of a 550 cu. ft. cold room and equipment has recently been completed at Glasgow University. The room is fitted out as a small research laboratory, and can be used for storage of blood plasma, and the stoppage or retarding of bacterial growth in the various solutions and solids undergoing inspection for research purposes.

British Balances Chosen.—J. W. Towers & Co., Ltd., of Widnes, which recently secured a contract for the supply of a large number of their Model 75 analytical balances to one of the leading universities in Canada, has now received a further contract, bringing the total value to over \$20,000 Canadian. The Towers balance was selected from six other makes from various countries by a board of professors of the university.

Textile Institute Awards.—To encourage young students the Midlands section of the Textile Institute recently held a competition for the best papers written on textile subjects. The choice of subject was free and originality encouraged. Competitors were divided into two classes, A, those aged 21 and under, and B, over 21. Mr. F. R. Kirkland, Mayfield, Derbyshire, won first prize in section A; and Mr. F. Millard, of Coventry, was first prize winner in section B.

British Council Conference Grants.—The British Council has a small fund to assist overseas delegates to attend national or international conferences on scientific subjects, held in the United Kingdom. Conveners of conferences to be held during April 1, 1949–March 31, 1950, are invited to apply to the Director, Visitor's Department, British Council, 3 Hanover Street, W.1, by January 15, 1949, giving particulars of their conference and the number of delegates (and their nationalities) who will require assistance.

Coal Output Up Again.—The 1948 open-cast coal objective of 11 million tons has been exceeded by more than 90,000 tons, while there are four weeks still to go. It is not thought likely, however, that the more important deep-mined coal target of 200 million tons will be achieved. In the four remaining weeks of this year more than 18 million tons of deep-mined coal, an average of 4,500,000 tons a week, would be required. Comparative total figures are: Last week, 4,340,100 tons (4,146,500 tons deep-mined, 193,600 tons open-cast). Previous week: 4,265,000 tons (4,086,000 tons deep-mined, 179,000 tons open-cast).

Paraffin Wax Price Reduction.—The Anglo-American Oil Company, Ltd., announces that the price of its paraffin wax and scale has been reduced as from December 1 by approximately £4 10s. per ton.

Further Reduction in Price of Rosin.—The Board of Trade announces that as from December 1 the price of FF wood rosin sold through the agency of the United Kingdom Naval Stores Association, Ltd., 46 St. Mary Axe, London, E.C.3, is reduced from £47 by £3 to £44 per ton net ex warehouse.

Exports Record.—The provisional value of exports in November is £147.1 million. This was £1.4 million more than in July, when the previous highest figure was recorded. These figures were given by Mr. Harold Wilson, president of the Board of Trade, at a dinner on Tuesday last, when he declared the export target set for this year (150 per cent of the 1938 total) had been achieved.

Extended Control of Engagements.—The Minister of Labour has announced that he will extend the operation of the Control of Engagement Order, 1947, from January 1, 1949, when it would have expired, to January 1, 1950. This is effected by the Control of Engagement (Amendment) Order, 1948, which was made by the Minister on December 1, and which comes into operation on December 15.

Largest Aeroplane Tyre.—The largest aeroplane tyre ever made in the British Commonwealth has been built at Fort Dunlop for the General Aircraft Company military transport. With its inner tube it weighs more than $\frac{1}{2}$ of a ton, is almost 7 ft. high and 31 in. thick. It contains 224 miles of nylon cord, more than 3 cwt. of natural rubber, 76 lb. of carbon black and 23 lb. of high tensile steel bead wire.

Import of Otitic Oil.—Recalling the recent announcement that the purchase of otitic oil is to revert to private trade, the Board of Trade states that, while no further purchases are to be made on public account, stocks in the United Kingdom are sufficient to meet all reasonable demands for some time and a further announcement will be made as soon as the board is prepared to issue import licences. The price of this oil was recently reduced to £150 per ton ex store. Supplies will continue to be made available freely by the Sundry Materials Branch of the Department through their agents, the Otitic Oil Co., of London and Liverpool. A licence to purchase and use this oil is no longer required.

Next Week's Events

MONDAY, DECEMBER 13

Society of Chemical Industry. Leeds: University, 7 p.m. H. J. Hodsman and A. A. Clark: "Control of the Fluidity of Bituminous Materials by Means of Lime."

Institution of the Rubber Industry. Manchester: Engineers' Club, Manchester, 6.15 p.m. Dr. C. F. Flint: "Moulded Latex Goods."

Institute of Metals (Scottish Section). Glasgow: Institution of Engineers and Shipbuilders in Scotland, 39 Elmbank Crescent, 6.30 p.m. G. Meikle: "The Uses of Non-Ferrous Metals for Aircraft."

Electrodepositors' Technical Society. London: Northampton Polytechnic, St. John Street, Clerkenwell, E.C.1, 5.30 p.m. P. B. Upton: "Electrodeposition in the Printing Industry."

TUESDAY, DECEMBER 14

The Royal Institute of Chemistry (London and South-Eastern Counties Section). Mitcham Junction, Material Research Laboratory, Philips Electrical, Ltd., New Road, 7.15 p.m. R. J. Hercock: "The Theoretical Basis of Photography."

Society of Chemical Industry. London: Royal College of Science, Imperial Institute Road, S.W.7. Joint meeting, London Section, Agriculture and Food Groups, 5.30 p.m. C. A. Loombe: "World Cereals To-day." Plastics Group, Gas Industry House, 1 Grosvenor Place, S.W.1, 2.30 p.m. Dr. D. D. Eley: "Biological Polymers."

Institution of Chemical Engineers. London: Geological Society, Burlington House, W.1, 5.30 p.m. Dr. H. E. Crossley: "Deposits on the External Heating Surfaces of Water-Tube Boilers."

Society of Glass Technology. Manchester. "The Properties and Utilisation of Coals."

Institution of Structural Engineers. Manchester: College of Technology, 7 p.m. R. A. Foulkes: "The Use of Light Alloys in Structures."

WEDNESDAY, DECEMBER 15

Institute of Welding (North London Branch). East Ham Technical College, 7.30 p.m. Open discussion on welding methods.

Institution of Works Managers. Sheffield: Royal Victoria Station Hotel, 7 p.m. H. G. Winbolt: "Industrial Safety."

Royal Statistical Society (North-Eastern Group). Newcastle-on-Tyne: Chemical Industries Club, 18 Louvain Place, 6.30 p.m.

W. J. Ross: "Some Problems in Initiating Statistical Control."

Electrodepositors' Technical Society. London: Charing Cross Hotel, Strand, W.C.2, 6.30 p.m. Informal dinner.

THURSDAY, DECEMBER 16

Institute of Metals (Sheffield Local Section). Sheffield: Grand Hotel, 6.30 p.m. Dr. L. B. Hunt: "The Electrometallurgy of Silver."

Royal Institute of Chemistry. Nottingham: Technical College, 7.15 p.m. Dr. C. Hampshire: "Some Observations on Pharmacopœias (with a special reference to B.P. 1948)."

The Royal Society. Burlington House, London, W.1, 4.30 p.m. B. Katz: "The Electrical Properties of the Muscle Fibre Membrane." M. F. Perutz: "An X-ray Study of Horse Methaemoglobin. Part II."

Electrodepositors' Technical Society (Sheffield and North-East Centre). Sheffield: Grand Hotel, 6.30 p.m. Dr. L. B. Hunt: "The Story of Silver from Mine to Metal."

FRIDAY, DECEMBER 17

Sir John Cass Technical Institute (Department of Chemistry). Jewry Street, Aldgate, E.C.3, 6 p.m. G. E. Stephenson: "Vitrous Silica."

WORK OF THE BAC

PROPOSING the toast of "The Profession of Chemistry" at a dinner of the London Section of the British Association of Chemists recently, the chairman of the section, Mr. H. L. Howard, alluded to the past and present work of the BAC. He said no other body was similarly organised to deal with the economic interests of the chemist, and it was this work which the association carried out to the great advantage of its members and of the profession generally.

It was now generally recognised that the work of the BAC was complementary to that of the Royal Institute, and he hoped and believed that there would be even closer co-operation between the two societies in the future.

Dr. Freeth spoke of the different conditions which existed in the profession to-day. When he was a young man, posts were difficult to secure and the salaries paid were inadequate. The situation had now changed because of the vast increase in the application of chemistry to industry. The progress reflected the increased prestige which the profession enjoyed.

Overseas News Items

Chemicals in Stamp Design.—To mark the revival of the chemical industry in Japan a new 50-sen postage stamp has been issued bearing a design showing various chemicals.

German Chemical Company's Transfer.—The management of Riedel de Haën, Berlin, manufacturers of chemicals, has decided to move the company's seat from Berlin to Seelze, near Hanover.

Belgian Lithopone.—Guest Industrials, Ltd., has been appointed sole selling agent for the United Kingdom for the sale of Belgian lithopone on behalf of *Produit Chimiques de Nieupoort, S.A.*, of Brussels and Nieupoort.

Aerial Surveys.—An expedition undertaken by Hunting Aerosurveys for the Anglo-Iranian Oil Company, the sixth of its kind, has left on a two or three-year contract for an aerial exploration of large areas of uncharted mountains and deserts in Iran. It will remain in the field for six months each year.

World Tin Output.—World production of tin reached a new post-war record in September according to the statistical Bulletin of the International Tin Study Group of The Hague. Tin concentrates rose from 12,300 long tons in August to 13,400 tons, and tin metal showed 15,500 tons in September against 13,500 the previous month.

Russian Rubber Purchases.—Almost 100,000 tons of Malayan rubber were acquired by the U.S.S.R. during 1947 and the first nine months of this year. This was announced by Mr. Creech Jones, Colonial Secretary, to be in accordance with our trade arrangements with Russia. It is officially reported from Ceylon, however, that the bid made by the U.S.S.R. to acquire the whole of Malaya's rubber output has been rejected.

Conflicting Views on Radiation Risks.—Two doctors who together studied at first hand the biological effects of the explosion of atomic bombs during the Bikini tests have disagreed in their conclusions on the dangers of radiation. Dr. Austin M. Brues, of the University of Chicago, says: "Radiation, like many other things, creates an illness, some symptoms of which can be counteracted by known treatments," but radiation had no effect that could not be duplicated by some drug or chemical. Dr. David Bradley believes there are no satisfactory counter-measures and methods of decontamination, and no satisfactory medical or sanitary safeguards.

Scientist's Appeal Rejected.—Dr. Raymond Boyer, wealthy Canadian professor of chemistry, has lost his appeal against a two years' sentence imposed in Canada a year ago for violating the Official Secrets Act.

Anglo-Iranian Oil Co.'s Record.—In May of this year the Anglo-Iranian Oil Company obtained the highest monthly output of its history with a production of 2.25 million tons of crude oil.

Appeal Succeeds.—The West African Appeal Court in Lagos has reduced from £90,000 to £4000 the total of fines imposed in July by the Nigerian Supreme Court on the United Africa Company for charging more than permitted prices for foodstuffs.

S. Rhodesia Iron and Steel Output.—Since the Rhodesian Iron and Steel Works began producing steel ingots at the end of May, 1948, 5000 tons of steel has been sent by rail from Que-Que and the monthly output of pig-iron is averaging some 1200 tons. Electric furnaces are being installed to increase steel output by 50 per cent.

Future of Tin Study Group.—Proposals for an international tin agreement, as laid down in principle at The Hague, will be put forward by the International Tin Study Group Working Committee in Washington shortly. If accepted by the American Government, the agreement will become operative next spring and the study group will be replaced by a body appointed by 14 countries.

Capital for French Oil.—The *Compagnie Française des Pétroles*, which controls the French participation in the Iraq Petroleum Co., Ltd., proposes to issue new shares to the value of 3481 million francs, the proceeds to be utilised for the construction of new pipe lines for the Iraq Oil Co., Ltd. The total capital, which was increased from 2526 to 5222 million francs earlier this year, will thus be brought to 8703 million. Of the new issue, the Government is to take over shares worth 1218 million francs.

Coal for Steel.—The French Embassy Information Division in New York announced last week that an Iron and Steel Research Institute is soon to be established at Saint-Germain-en-Laye to deal with basic problems beyond the scope of private laboratories, notably the possibility of utilising more of the coal mined in France for the manufacture of steel. Such an institute was projected in 1938, but was postponed as a result of the war. The necessary funds will be secured by an assessment on sales of cast iron and steel.

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

FERGUSON EDWARDS, LTD. (formerly FERGUSON EDWARDS & CO. (LONDON), LTD.), London, W. (M., 11/12/48.) November 4, £50,000 charge to Abbey National Building Society; charged on factory premises and cottages, 84, 86, 88 and 90 and other buildings and warehouses all Abbey Road, Barking. *— December 31, 1946.

SYNTHELENE, LTD., London, E.C. (M., 11/12/48.) November 4, £100 debenture to C. F. N. Etches, Seaford, and £100 debenture to C. H. Masters, Hook; general charges.

TYBORITE, LTD., London, W.C. (M., 11/12/48.) November 1, mortgage and charge to National Provincial Bank, Ltd., securing all moneys due or to become due to the bank; charged on Spraysine Works, 62 Sunningdale Road, Cheam, with plant, fixtures, etc., and general charge.

Satisfactions

BEARDALLS, LTD., Nottingham. (M.S., 11/12/48.) Satisfaction November 3, £1300, registered December 20, 1926.

EXPANDED RUBBER CO., LTD., Croydon. (M.S., 11/12/48.) Satisfaction November 5, of mortgage registered January 26, 1937.

ORGAHUME, LTD., Worcester. (M.S., 11/12/48.) Satisfaction November 3, £585, registered December 18, 1944.

New Companies Registered

Ames Polish Co., Ltd. (461,495). Private company. Capital £2000. Manufacturers of paints, colours, dyes, oils, etc. Directors: B. F. Ames and R. J. Ames. Reg. office: New Barn Lane, Prestbury, Cheltenham.

Art and Industrial Moulders, Ltd. (461,534). Private company. Capital £100. Manufacturers of plastic materials; workers in plastics, glass chemicals, metals, etc. Directors: B. L. Butcher and W. T. Buckley. Reg. office: Pilling Street (Ten Acres Lane), Newton Heath, Manchester.

Blewro (Chemical Processes), Ltd. (461,686). Private company. Capital £2000. Manufacturers of electrolytes and electrolytic processes, plating processes and solutions, and chemical processes. Directors: J. F. Blewitt and A. W. E. M. Rockett. Reg. office: Shapters Field, Cattedowne, Plymouth.

Elm Plastics, Ltd. (461,428). Private company. Capital £800. Manufacturers of articles and tools for use in the plastics industry, plastic materials, etc. Director: W. C. Hole. Reg. office: Bishops House, Gads Hill, Gillingham, Kent.

Stimson and Duff, Ltd. (461,090). Private company. Capital £2000. Insect exterminators, manufacturers of fumigants, chemicals, etc. Solicitors: Mellows & Sons, Peterborough.

Company News

Allen & Hanbury, Ltd.—Trading profit in the year ended June 30, £483,567 (£348,842 in 1947), and net profit £138,971; ordinary dividend on the increased capital 17½ per cent (same).

Anglo-Chilean Nitrate Corporation, Ltd.—Profits in the year ended June 30 were \$2,818,789 (\$2,489,154), equivalent to \$1.34 per share (\$1.18).

British Chemical Prices

Market Reports

STEADY to firm values continue to be maintained in the industrial chemicals market and price changes, where they have occurred, have been no more than slight adjustments. A sustained demand is the best description of most sections of the market during the past week. New buying orders from home consumers have been on a good scale and delivery specifications have been up to the full extent of contract commitments. The volume of export inquiry, too, shows no signs of diminishing.

Demand for the alkali products continues strong and it is generally thought that the recently announced plans for a substantial increase in production will no more than meet the potential home and overseas demand. Chlorate of soda is again in good call and there are ready buyers for bichromate of soda. There has been no change in the potash products section, where all available supplies are quickly absorbed. Elsewhere, formaldehyde is in good request and an active trade has been done in hydrogen peroxide, arsenic and sulphate of aluminium. The call for paint raw materials remains

persistent and both white lead and red lead are in brisk demand at convention rates. The supply position in the coal-tar products market has become steadily easier and by and large buyers are able to place their requirements. Creosote oil and the pyridines remain perhaps just a little tight against a strong demand. The export demand remains good and prices throughout the section are steady to firm.

MANCHESTER.—Although a seasonal slackening of new buying interest in chemicals is expected to make its appearance before very long, there has been no indication of this as yet on the Manchester market. The past week has seen a steady flow of inquiry from home trade users covering a wide range of products, including caustic soda, soda ash and the other alkalis, and pressure for actual deliveries of materials already ordered has been maintained. Interest on the part of shippers with regard to export business has also continued in evidence. In the market for tar products, there are few lines which are not meeting with a steady demand.

GLASGOW.—The Scottish chemical market has been fairly active during this past week but with no noteworthy change in the supply position. Inquiries for most materials have remained unchanged, except of course for those materials affected by the recent increase in price of zinc spelter. The supply position of carbon tetrachloride has eased a little, but deliveries are still behindhand. Conditions have also been active in the export market, particularly with regard to preliminary work for deliveries during 1949.

Chemical and Allied Stocks and Shares

HIGHTENED international tension in Berlin curbed business and, led by a reaction in British Funds, markets have lost some ground, although movements in leading industrials generally have not exceeded more than a few pence. Selling remained very moderate, and, as is often the case at this period, buyers appear to be holding off until the new year.

The belief that further relaxation of controls will be announced early in 1949 has also influenced markets. It is realised that, with increased competition next year, financial results may cease to follow the uniform pattern ruling since the end of the war. The view is growing that such competition may result in a big set-back in results of some of the newer and smaller industrial concerns.

Considerations of this kind do not apply

to chemical and kindred companies, and chemical shares have in most cases been relatively steady, although not altogether immune from the easier trend of markets. Imperial Chemical eased to 48s. 3d., but elsewhere, Burt Boulton & Haywood remained steady at 28s. 9d., and Monsanto Chemical 5s. ordinary held their recent rise to 62s. 6d. Fisons remained at 59s., and Laporte 5s. ordinary were 21s. 6d. Albright & Wilson 5s. shares were again 31s. 3d., and Amber Chemical 2s. shares 9s.

Glaxo Laboratories after a further rise eased to £19, and in other directions, the capital increase proposals weakened. British Drug Houses 5s. ordinary to 9s. Elsewhere, British Glue 4s. ordinary firmed up to 21s. Hopes that the London Metal Exchange may be allowed to reopen early next year kept Amalgamated Metal shares steady at 21s. 6d. British Aluminium have eased to 49s. 9d., and British Oxygen to 103s. 9d., while Turner & Newall at 79s. 9d., and United Molasses at 50s. 9d. lost part of recent gains.

Metal Box shares showed firmness at £5½, but elsewhere, De La Rue came back to 37s., British Industrial Plastics 2s. shares were steady at 2s. 10½d., and Lever & Unilever at 51s. 10½d. failed to hold the best levels.

Iron and steels eased a few pence where changed, and in a few additional cases are now quoted slightly below take-over levels. This is because the position of iron and steel companies cannot be assessed until it is known how they will be affected by the expected release of some of their non-steel assets from the threat of nationalisation. Dorman Long have eased to 32s. 9d., United Steel to 29s. 10½d., Hadfields to 30s. 9d., and Coalvilles to 37s. 6d. On the other hand, Staveley improved slightly to 90s. after an earlier decline. Babcock & Wilcox kept firm around 72s., and T. W. Ward were 66s. 9d. Borax Consolidated, after their recent rise, eased to 63s. 9d. British Plaster Board held firm at 23s. 6d. and the 4s. units of the Distillers Co. were 29s. 7½d.

Tube Investments continued to change hands around £6½, Triplex Glass 10s. ordinary remained close on 10s. The market believes that earnings of the latter company are continuing on the up-grade, but on the other hand, shareholders cannot expect to benefit until voluntary dividend limitation is no longer in force. Boots Drug at 55s. 6d. lost a little ground, but Sangers have been firm at 34s. 3d. Elsewhere, Goodlass Wall 10s. ordinary kept around 38s. Oils were uncertain with Shell at 76s., and Iranian £8½, but V.O.C. remained active up to £6½ on continued market talk that Shell may make an offer for the remaining balance of V.O.C. shares.

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2, at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Adhesive compositions.—B.B. Chemical Co., Ltd. March 9, 1945. 610,345.

Generating vapours from solids.—B. F. Goodrich Co. May 1, 1945. 610,563.

Glass fibres.—Glass Fibres, Inc. Nov. 13, 1945. 610,564.

Manufacture of dyestuffs and intermediates.—I.C.I., Ltd., S. Coffey, G. W. Driver, D. A. W. Fairweather, and F. Irving. March 26, 1946. 610,117.

Compositions containing diazotisable amines or diazonium salts thereof.—American Cyanamid Co. June 19, 1945. 610,126.

Stabilised olefinic polymers and copolymers.—C. Arnold. (Standard Oil Development Co.) March 27, 1946. 610,129.

Method and apparatus for extruding.—L. B. Green. March 28, 1946. 610,132.

Capsules.—W. W. Triggs. (Gelatin Products Corporation.) March 28, 1946. 610,133.

Recovery of terephthalic acid from polyesters.—I.C.I., Ltd., and R. L. Heath. April 28, 1946.

Degradation of aromatic linear polyesters.—I.C.I., Ltd., and R. L. Heath. March 28, 1946. 610,136.

Process for incorporating pigments or delustrants with highly polymeric linear esters.—I.C.I., Ltd., J. T. Dickson, R. L. Heath, and R. J. W. Reynolds. March 28, 1946. 610,137.

Process for stabilising highly polymeric linear esters.—I.C.I., Ltd., J. R. Lewis, and R. J. W. Reynolds. March 28, 1946. 610,138.

Melt blending of aromatic polyesters with other polymeric materials.—I.C.I., Ltd., J. T. Dickson, and R. J. W. Reynolds. March 28, 1946. 610,140.

Algacide composition.—M. Gelfand. March 28, 1946. 610,150.

Manufacture of article coated with organosilicon compositions.—Corning Glass Works. July 25, 1945. 610,152.

Production of gamma-butyrolactone.—I.C.I., Ltd., D. G. Jones, and F. Dean. March 29, 1946. 610,166.

Sizing of aromatic polyester yarns.—I.C.I., Ltd., and R. J. Smith. March 29, 1946. 610,167, 610,168, 610,169.

Plastic articles reinforced with filaments, fibres, yarns, fabrics, and the like.—I.C.I., Ltd., B. P. Ridge, and J. T. Watts. March 29, 1946. 610,170.

Production of organic nitriles.—E. I. Du Pont de Nemours & Co. March 30, 1945. 610,172.

Glass and other thermoplastic tubes.—S. J. Everett. March 29, 1946. 610,182.
Heat treatment of highly polymeric linear esters in the form of fibres, yarns, bristles, films, fabrics, and the like.—I.C.I., Ltd., and P. W. Carlene. March 29, 1946. 610,183.

Hot wet processing of molecularly orientated shaped articles formed from aromatic linear polyesters.—I.C.I., Ltd., and R. G. Bartlett. March 29, 1946. 610,184.

Hydrocarbon alkylation process.—C. Arnold. (Standard Oil Development Co.) March 29, 1946. 610,186.

Process for the catalytic aromatisation of aliphatic hydrocarbons.—N.V. De Bataafsche Petroleum Maatschappij. March 7, 1940. 610,189.

Process for manufacturing mineral greases containing barium and/or strontium soaps.—N.V. De Bataafsche Petroleum Maatschappij. Nov. 4, 1944. 610,190.

Manufacture of ether-esters of organic hydroxy acids.—Roche Products, Ltd., A. L. Morrison, and M. Konginstein. March 30, 1946. 610,198.

Compositions containing hardness-sequestering phosphate and stabilising agents.—Albright & Wilson, Ltd. (Hall Laboratories, Inc.) March 30, 1946. 610,201.

Method of making refractory metal composition.—Mallory Metallurgical Products, Ltd. (P. R. Mallory & Co., Inc.) April 2, 1946. 610,246.

Preparation of sulphanilamido heterocyclic compounds.—Merck & Co., Inc. April 10, 1945. 610,250.

Manufacture of organic amino compounds.—E. I. Du Pont de Nemours & Co. April 3, 1945. 610,263.

Manufacture of fibre-forming synthetic linear polyamides.—E. I. Du Pont de Nemours & Co. April 3, 1945. 610,264.

Manufacture of diguanide compounds.—Boots Pure Drug Co., Ltd., W. F. Short, G. I. Hobday, and P. Oxley. April 3, 1946. 610,379.

Insecticides.—United States Rubber Co. June 19, 1945. 610,279.

Back washing filter beds.—R. P. Moore. April 4, 1946. 610,412.

Process and apparatus for carrying out exothermic catalytic reactions in the vapour phase.—N.V. De Bataafsche Petroleum Maatschappij. May 26, 1944. 610,421.

High-temperature recuperative furnaces.—C. E. Every. April 4, 1946. 610,425.

Dehydration of particulate calcium sulphate.—I.C.I., Ltd., and R. G. Franklin. April 5, 1946. 610,439.

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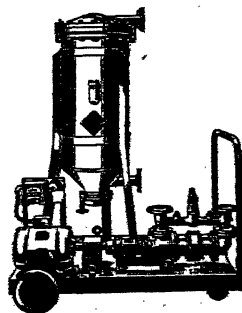
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Production of preferred crystal orientation in thin gauge silicon steel.—British Thomson-Houston Co., Ltd. April 12, 1945. 610,440.

Means for mixing flowing liquids together, especially suitable for mixing a relatively small intermittent or uneven supply with a relatively large continuous flow.—F. P. Candy, and W. D. J. Thomas. April 6, 1946. 610,458.

Manufacture of alkyl benzene peroxides.—Distillers Co., Ltd., R. H. Hall, and D. C. Quin. April 8, 1946. 610,293.

Fluid storage devices.—Chicago Bridge & Iron Co. Dec. 29, 1945. 610,479.

Method of centrifugal separation of sludge-containing liquids.—Separator A/B. April 18, 1945. 610,482.

Purification of quicklime or other alkaline earth oxide produced in lump form by calcination in contact with fuel or fuel gases.—N.V. S. Knibbs. April 8, 1946. 610,498.

Apparatus for sifting materials.—Brooke Bond & Co., Ltd., and W. M. Cooke. April 9, 1946. 610,298.

Preparation of adhesive compositions.—British Industrial Plastics, Ltd. April 18, 1945. 610,302.

Method of preparing an anti-malarial acridine compound. Oct. 5, 1942. 610,581.

Process for producing carbonyl compounds.—Universal Oil Products Co. April 28, 1945. 610,397.

Device for supplying a measured quantity of liquid.—S. E. Bullock, W. E. Kendrick, and T. H. Faulkner. July 1, 1946. 610,596, and 610,602.

Machines for processing rubber, plastics or the like.—F. E. Brown. March 1, 1946. 610,597.

Processing of hydrocarbons.—Anglo-Iranian Oil Co., Ltd., E. W. M. Fawcett, and E. S. Narracott. April 7, 1941. 610,703.

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Lines of Communication

THE publication by the Royal Society of the names of those who will serve as a committee to study means of collecting, reproducing and distributing scientific information indicates that those who sponsored and participated in the Society's Scientific Information Conference a few months ago are not content with having stated a case for reorganising these services. In view of the number and complexity of the difficulties, which were brought to light in the course of the conference discussions, and of the controversial character of some suggested "simplifications," that seems to show that those who have campaigned for reorganisation are endowed with plenty of determination. They will need that characteristic in full measure and some others even less common in deciding what would be the merits of a new order, compared with the difficulties—and some dangers—inherent in an attempt to canalise a veritable maze of information channels.

It is obvious that no new workable method of making available originally from one fountainhead all new contributions of any weight to scientific knowledge can be quickly designed; whether it is in fact a practical possibility is by no means certain.

Criticism at the conference of the present state of affairs made effective use of the arguments that the multiplicity of sources of information and the great acceleration of the rate at which data were

being produced completely bewildered those who most needed to use them. Correspondingly, most scientific workers have now less time to seek their own pearls submerged in this limitless ocean of words than they had when the sources were fewer.

It is conspicuous from the start that neither of those characteristically modern embarrassments can be made any the less permanent by taking thought or by any machinery which the Royal, or any other, society can devise. The belief, persists, however, that the flood can be made to flow along a fairly closely charted course. The efforts of the newly constituted committee will therefore be directed presumably to determining whether simplification is a possibility, by classification and perhaps by limiting the avenues through which scientific information now comes, and that necessarily involves some responsibility to indicate what shall be the steps, if the feasibility is admitted.

No one will dispute the weight of the burden which the investigators have taken up, or envy them. Their reasons for undertaking what many regard as an impossibility are cogent enough. They are being recalled now by the *Journal of Scientific and Industrial Research* (Vol. vii, 9, 367-368) which presents them in reasonably comprehensible form. The present system, it is said, results in

On Other Pages

Leader:		
<i>Lines of Communication</i> ...	805	<i>Standardised Screw Threads</i> ... 814
Notes and Comments:		<i>British Casting Process</i> ... 814
<i>Survey of Chemical Industry</i> ...	807	<i>World Power Conference</i> ... 814
<i>Union Officials Deposed</i> ...	807	<i>Absorption and Desorption of Carbon Dioxide</i> ... 815
<i>Migration to Industry</i> ...	807	<i>Revived Scientific Research in China</i> ... 815
<i>Electronic Duplicator</i> ...	808	<i>Benzoic Acid in Germany</i> ... 816
<i>International Book Tokens</i> ...	808	<i>Nitric Acid Process</i> ... 818
<i>Information Services</i> ...	809	<i>Using the "Nuclear Projectile"</i> ... 819
<i>News of Russian Science</i> ...	809	<i>Progress in Radiochemistry</i> ... 820
<i>University Salaries</i> ...	809	<i>Indian Plastics Industry</i> ... 820
<i>Chemical Plant Repairs</i> ...	809	<i>Depreciation and Maintenance—V</i> ... 821
<i>Inadequate Glass Supplies</i> ...	809	<i>Small-Scale Water Treatment</i> ... 824
<i>Chemistry Training</i> ...	810	<i>Simplified Removal of Ionised Solids</i> ... 824
<i>British Goods in Turkey</i> ...	810	<i>New Enterprises in South Africa</i> ... 825
<i>Carbon Black Project in the Balance</i> ...	811	<i>Replacing Chemical Fertilisers</i> ... 826
<i>Lancashire Plants Sanctioned</i> ...	811	<i>French Chemical Shortage</i> ... 826
<i>Oil Refinery Extension</i> ...	811	<i>Canadian Chemical Review</i> ... 827
<i>Production and Stocks of N-F Metals</i> ...	812	<i>Railway Chemistry</i> ... 830
<i>Undeveloped Magnetite and Lime</i> ...		<i>London HQ for Czechoslovak Chemicals</i> ... 830
<i>Deposits in Scotland</i> ...	812	<i>Breach with Soviet Academy</i> ... 832
<i>Italian Aluminium</i> ...	813	

"absolute loss of knowledge," because some papers never meet the eye of those working on parallel lines; "relative loss of knowledge," because delay in publication may withhold papers until their usefulness has passed; inconvenience, of having possibly to give time which should be devoted to research to a search of the literature; increasing cost of publication; and extravagant use of manpower on an extremely complicated and overlapping series of small undertakings producing scientific literature.

Some of these complaints are well founded, but nothing seems yet to have been said for the reverse aspect of the picture, the facts that despite all these inefficiencies most workers develop an unerring instinct for garnering all the grain they need and rejecting the chaff; and that those now employed in presenting that information in printed form would not necessarily be fewer were all the papers to be submitted in the first place to a central distributing authority.

The last was in fact the solution warmly sponsored by at least one member of the present committee. Against its conspicuous advantages, which may, of course, be superficial, must be weighed the most objectionable possibilities which are called to mind by the word "censorship." While the prospect of deliberate suppression of a

paper for any unworthy reason is so remote as to be almost ridiculous, it is equally certain that much damage can be wrought inadvertently and with the best intentions.

The Chemical Society killed with derision J. A. R. Newlands' tentative attempt to convey to them the principle of what was later acclaimed as the Periodic Theory. Are we now infallible?

(Constitution of the Royal Society Committee: page 809)

USING GERMANIUM

IN 1886 a greyish-white brittle metal, germanium, was discovered, and was for many years considered to be very rare; but it has recently been found to be present, up to one per cent, in the ashes of certain coals.

Investigating the recovery of germanium from the flue dust of furnaces, the Chemical Research Laboratory, DSIR, at Teddington, has evolved a new method for recovery of the metal. The dust is fused with caustic soda and the melt extracted with boiling water and filtered. It is then acidified and the metal removed with hydrogen sulphide and precipitated with tannin.

This new means of obtaining this metal, is particularly interesting, as the employment of germanium in electronic uses is showing promise.

The controlling of electrons by a solid crystal instead of in a vacuum, is expected to have great possibilities and may well rank in importance with the electron tube.

NOTES AND COMMENTS

Survey of Chemical Industry

NEWs this week that the Association of British Chemical Manufacturers has accepted a Board of Trade invitation to submit on behalf of chemical industries a full-scale survey of present plans and of future needs and prospects seems to dispose of any illusion that Government interest in the processes of chemical production has dwindled since Mr. Harold Wilson congratulated the industry a few months ago on having been spared the "ordeal by working party." The President of the Board of Trade, telling the House of Commons on Tuesday of the Government's desire to have a comprehensive survey of the chemical industry "showing its long-term plans, its probable lines of development and the steps regarded as necessary to meet the objectives," mentioned that the TUC was in agreement with this line of approach. No decisions on policy, if any were called for, said the President of the Board of Trade, would be made without further consultation with both sides of the industry. It will be apparent that the difference between this method and the working party principle, which has been distinguished in the past by ineffectiveness, is not very conspicuous, and it is open to doubt whether the "ready agreement," which according to Mr. Wilson the ABCM has given to the Government request for a survey, will be repaid by any improvement in facilities for fuller production. The association is said to be endeavouring to produce its report by next summer; not the least of its problems may be to define, for Government purposes, what are and are not chemical industries. The current interpretation of what constitutes the iron and steel industry will be borne in mind.

Union Officials Deposed

CHEMICAL workers, it would appear, are not immune from the recurrent outbreaks of anarchy in workers' organisations, represented by an increasing readiness to discredit their own elected representatives. The scandalous disregard of the traditional machinery for negotiation by some members of the National Union of Railwaymen at Euston seems to have been symptomatic of a widespread

willingness to upset the apple cart. An equally violent schism arising out of dissension of a quite different kind has lately been threatening to disrupt the Chemical Workers' Union, of which the first public manifestation was a court application against certain officials a few weeks ago which has been followed by a decision taken at a meeting in Manchester on Sunday, at which 33 of the 44 branches of the union were represented, to depose the president and the national executive council, in whom the meeting's want of confidence was forcibly expressed. They elected a new president (Mr. Arthur Seaton) and a new executive council. It would be clearly unprofitable to attempt to unravel the rights and wrongs of this dispute in which a group of established officials are being accused of "sabotage," but it is certainly permissible to hope that the civil war will be quickly and finally ended. Managements up and down the country have helped to confer authority on this union and the larger national body to which it is affiliated. By willing collaboration, working conditions and wages in chemical industries have been so amicably regulated that no stoppage of any magnitude has been recorded for a period of years. The whole basis of that considerable achievement may be endangered if the Chemical Workers' Union fails to maintain elementary order and discipline within its own ranks.

Migration to Industry

THE inadequacy of the rewards which intellectual achievement of the academic sort commands is an anomaly which custom is rendering axiomatic. This odd state of affairs, to which our leading article called attention last week, finds fresh evidence in some of the advertisements of public appointments. Salaries, where they are mentioned, go to show that a man who has devoted years of his life to study and been committed to large expenditure in the bargain, may receive at the end, a salary which to a leader of industry or a screen actor would be inadequate as pocket-money. This problem is apparently not confined to this country. In an article in the *Journal of Chemical Education*, Harry F. Lewis, dealing with chemical education in America to-day,

deplores a definite deterioration in the quality of teaching and the scarcity of good teachers. The latter he attributes partly to post-war restlessness, but mainly to the fact that the fixed income of the professor or specialist lecturer barely covers the increased cost of living, which has impelled these people, indispensable to science, to be preserved and transmitted, to migrate to industry. It is, as he suggests, a shortsighted policy; industry might do better to supplement the salaries of teachers and keep them teaching. Here is a matter well worth more attention in this country, where the problem is even more acute than in America.

Electronic Duplicator

WHATEVER other conclusions may be reached by the panel set up by the Royal Society to study existing scientific information services, it is probable that they will place high in the list of impediments to fuller distribution the time and expense consumed in the actual reproduction of papers. While conventional printing methods must remain the best means for permanent recording, the various simple office duplicating systems have rendered the most valuable service in making available long abstracts or summaries pending the fuller presentation with benefit of printers. America's latest addition to the duplicating technique, "xerography," of which a preliminary brief description was given by the U.S. Information Service last week, has accordingly a topical importance, assuming that it fulfills the remarkable claims that have been made for it. The invention of a New York patent attorney, Mr. C. F. Carlson, and developed by the Battelle Memorial Institute, this innovation employs a metal equivalent of a photographic plate charged with static electricity. It is rendered sensitive to light by being subjected to a corona discharge and when exposed in a camera or contact printing frame a "latent electrical image" is created on the surface. A special powder, negatively charged, is attracted to the electrically charged image and can be readily transferred to paper, when the latter is more powerfully charged by the electronic means used to sensitise the plate. Heat will then cause the powder granules to melt and fuse permanently

with the paper. The ingenuity underlying this employment of one of the oldest principles of electricity is undeniably attractive; if in fact it is as simple and effective as it appears its use as a quick duplicator of text and graphic material may confer on it an importance equal to that of the ubiquitous microfilm.

International Book Tokens

THE scholars and scientists in Britain will soon be able to purchase books from hard currency countries under a Unesco book-token scheme devised to overcome foreign exchange difficulties, to be operated with the co-operation of Book Tokens, Ltd. This is the substance of a welcome announcement by the Ministry of Education, which promises to relieve at least some of the prevailing dearth here of foreign science publications. The limitations of the scheme—an experimental one for a year—are inherent in the fact that the "bank" of \$150,000 worth of book coupons will be shared by 11 countries, including Great Britain. The coupons will be usable for the purchase of books on education, science and culture, the importation of which is at present prohibited, and for subscriptions to periodicals, for buying individual volumes or issues, and for the cost of photo-copies. The authorities here tell us that details have not yet been worked out with the Treasury and the Board of Trade of how an individual is to obtain a particular book or the tokens with which to purchase it, but the most likely solution is that dealings will have to be *via* the scientific or professional organisation, and it is even visualised that sometimes a single copy of a particular work may have to be consulted at some such central organisation. This presumably refers to some of the more costly works for which there will clearly not be sufficient dollars to cover the provision of private copies.

D-D Soil Fumigant

In a report on the results of D-D in soil fumigation (*THE CHEMICAL AGE*, October 23) it was stated on information received from Shell Chemicals, Ltd., that early research work was by Dr. Walter Crane, of the Pineapple Research Institute of Hawaii. This work should have been attributed to Dr. Walter Carter.

Information Services

Royal Society's Special Committee

ARISING out of the Scientific Information Conference held last June, the Council of the Royal Society has set up a Standing Committee on Information Services, on which the following have agreed to serve:—

Sir Alfred Egerton, F.R.S. (chairman); The treasurer and secretaries of the Royal Society, Dr. T. E. Allibone, F.R.S.; Prof. J. D. Bernal, F.R.S.; Dr. G. L. Brown, F.R.S.; Sir David Chadwick, Mr. J. E. Cummins, Dr. G. M. Findlay, Dr. J. E. Holmstrom, Dr. A. King, Dr. J. G. Malloch, Dr. C. F. A. Pantin, F.R.S.

The terms of reference of the committee, which had its first meeting on November 23, are: To advise on means of improving existing methods of publishing, abstracting, indexing and distributing scientific information and, in particular, to advise on the implementation of the recommendations of the Royal Society Scientific Information Conference; and to report to the council of the Royal Society.

NEWS OF RUSSIAN SCIENCE

SO little is known about Russian scientific developments that more than usual interest attaches to the announcement of an American firm, Research Information Service, 509 Fifth Avenue, New York 17, of a service of cataloguing, translating, and publishing in report form of articles from current Russian technical and scientific magazines. At present the company is preparing bulletins listing translations of articles in such fields as petroleum, metallurgy, agricultural chemicals, medicine and several others, and is working on a series of reports, to be published in the near future, dealing with general chemicals and chemical processes. One of the magazines stated to be regularly translated from is the *Russian Journal of Physical Chemistry*.

Cathode-Ray Development

A new three-dimensional technique has recently been developed with the cathode-ray oscillograph instead of the ordinary two-dimensional picture on a plane screen.

The cathode-ray oscillograph was used for many years purely as a research tool before becoming well known in connection with radar and television.

Many further applications of the three-dimensional technique are anticipated: to X-rays, and the possibility of images of various colours has also been suggested.

University Salaries

Government Urged to Augment Scales

REPRESENTATIVES of industry and education met in London last Saturday to discuss the problems of British universities in general and the London University in particular, at a conference organised by the campaign committee for the expansion of higher education. A resolution was passed demanding more financial assistance from the Government and an increase in university salaries to offset the higher rates paid in industry.

There was general agreement that one of the gravest checks on development of education facilities is shortage of staff, and it was recommended that students' amenities should be improved. A heated debate developed on the function of universities. Were they merely centres of culture and pure learning, or should they aim broadly at producing socially-conscious citizens? Among those who supported this wider aspect—apparently a majority of those present—was Prof. Onians (Bedford College). "Research for its own sake is not what is required for the country's needs to-day," he declared.

GERMAN CHEMICAL PLANT

THE 23 war plants in Germany containing general equipment suitable for peace-time uses have now been allocated by the Inter-Allied Reparations Agency. Among the I.G.F. plants at Ludwigshafen are one for aminosulphoric acids, one for pyrrolidine, and one for liquid sulphur dioxide. A complete section from Oppau will be included.

Other plants for reparations not yet allocated comprise sections for sodium sulphide production, atebine, hydrazine hydrate, cellulose derivatives and a section at Elberfeld for producing diverse resins. The Boehling Geb. plant containing equipment for inorganic and organic products is also included.

Inadequate Glass Supplies

A bottleneck in supplies of the specially hardened glass used for cathode-ray tubes in television sets caused 400 workers to be stood off at the Hayes, Middlesex, factories of Electric and Musical Industries. Permission has now been given by the Government for the importation of supplies of the glass from Belgium and Czechoslovakia and E.M.I. hopes soon to be able to re-engage the workers.

The uncertainty of deliveries of "blanks" of other glass categories meanwhile continues to impede the expansion of several types of scientific glassware.

Chemistry Training

Courses at Sir John Cass Institute

THE new session of the Sir John Cass Technical Institute, Jewry Street, Aldgate, London, E.C.3, which begins in January, comprises an interesting and comprehensive syllabus in the departments of chemistry and physics.

On Monday evenings, at 6.30 p.m., beginning on January 17, there is to be a course of some eight lectures on "Thermodynamics for Chemical Engineers," by N. W. Roberts. "Theory and Practical Applications of Polarography" is the subject of a course of six lectures, illustrated by exhibits and demonstrations, by J. V. Westwood, to be held on Friday evenings, from 6 to 8 p.m., beginning on February 25.

Prof. H. S. W. Massey is to give a course of six lectures on "Atomic Nuclei," on Tuesday evenings, from 6 to 7 p.m., beginning on February 1. Seven lectures on "Unit Operations in Chemical Engineering" are to be given on Friday evenings at 6.30 p.m., beginning January 23, by the following: J. C. Farrant (International Combustion, Ltd.); D. A. Johnson (Kestner Evaporator & Engineering Co., Ltd.); J. M. Coulson; G. A. Dummett (Aluminium Plant & Vessel Co., Ltd.); G. Haydon (S. H. Johnson & Co., Ltd.); A. Heeley (Thomas Broadbent & Sons, Ltd.); L. S. Yoxall (Foxboro-Yoxall, Ltd.).

"Microchemical Analysis" will be dealt with in ten lecture-demonstrations by David W. Wilson on Thursday evenings from 6 to 8 p.m., beginning on January 20.

BOYS' HOSTELS

TWENTY-one years ago recognition of the need for a hostel for boys in the East End of London led to the opening of John Benn House by the Prince of Wales. It was a fitting memorial to the late Sir John Williams Benn, founder of Benn Brothers, Ltd., whose youth was spent in Stepney and who later played an outstanding part in the public life of London.

The story of its beginnings and of the Boys' Hostels Association which grew out of it was impressively told last week in the form of a pictorial radio play, presented by boys living in John Benn House at Stepney, where the performance was given. Lord Leverhulme, Sir Ernest Benn and others voiced appreciation of the excellent show presented by the players, whose average age was 16½ years.

British Goods in Turkey

Fair and Medical Congress

THE annual Izmir International Fair, which was held in the Kùltür Park from August 20 to September 20, was attended by some 1.3 million people. Only four nations took separate pavilions according to the report in a recent issue of the monthly trade journal (No. 371) of the British Chamber of Commerce of Turkey.

British products, however, were displayed at 24 different stands, pavilions and show windows, covering nearly 450 sq. metres.

Among the exhibitors from the U.K. were: Fry's Metal Foundries, Ltd. (white metals); the General Chemical and Pharmaceutical Co., Ltd. (laboratory chemicals); John Kidd & Co., Ltd. (printing inks); Ilford, Ltd. (films and photographic papers); Hunter Penrose, Ltd. (stereotype reproducing machines); H. J. Elliott, Ltd. (laboratory measuring instruments); and Doulton, Ltd. (laboratory porcelain, water filters, etc.). Benn Brothers, Ltd., publishers of *Britanya Sanayii* and *THE CHEMICAL AGE*, had a wide selection of their publications on view at the BOECC stand.

The Fair proved itself an excellent opportunity for displaying to the Turkish public British textiles, machinery and plant, chemicals and hardware, though the opinion expressed was that more would have been gained if all the products could have been gathered together in one British pavilion, as it is hoped to do next year.

A medical congress and International Medical Exhibition were held in Ankara in October. One half of the exhibition hall was devoted to local laboratories and manufacturers; the other to foreign firms. Among the latter, British exhibitors were well represented by Burroughs Wellcome & Co.; Imperial Chemical Industries, Ltd.; Boots Pure Drug Company; the International Chemical Co., and John Wyeth & Bros.

CARE OF THE BLIND

TO carry on the work of a research chemist after having lost one's sight would seem to most people an impossibility. Yet this is one of the surprising achievements mentioned among the variety of careers and occupations which have been reported for the year ended March 31, 1948, of St. Dunstan's, which now cares for the blinded of two wars.

The original headquarters in Regent's Park was destroyed by bombing, but this year a new and permanent HQ was opened at 191 Marylebone Road, N.W.1.

Carbon Black Project in the Balance

U.S. Director on Heavy Overheads of Liverpool Project

THE prospects and some of the problems associated with the project by Godfrey L. Cabot, Inc., of Boston, U.S.A., to establish on Merseyside a plant capable of supplying some 25 per cent of the United Kingdom's requirement of carbon black were described in Liverpool last week by Mr. Louis Cabot, principal of the American organisation.

Mr. Cabot told members of the Liverpool section of the Institution of the Rubber Industry the plant proposed could save the country \$1.25 million a year. The decision whether to go ahead with the project had still to be taken by the directors of his company in Boston, and it had been noted that costs were going to be considerably higher than they thought at first.

Possible Output

Mr. Cabot, who would be managing director of the English organisation, said it was proposed the American company should invest the major part of the capital in a British subsidiary company which would have a plant similar to the plant in the U.S.A., from which carbon black was shipped in bulk to rubber plants. British rubber manufacturers would thus have similar facilities.

The grade of black to be produced mainly would probably be of the highly reinforcing type, called vulcan. Production would approximate to 20 million lb. a year, and the plant would employ about 40 men and possibly a few women. It would be necessary

at first to import a specially refined petroleum fraction only produced in a few refineries in the United States, but eventually it was hoped to find suitable raw materials in the United Kingdom which would produce the same quality.

No Decision Yet

"The project has now received the support of the Board of Trade and the Economic Co-operation Administration in Washington," said Mr. Cabot, "but this is not a definite guarantee that the project can go ahead. They are by no means the only hurdles we will have to clear before the project becomes reality. Detailed study here has shown that costs (labour, building and fuel) will be seriously higher than early investigations had led us to believe—for one thing more men would have to be employed than on similar work in the United States—but if it is at all possible to make an economic go of this thing we will push ahead to our utmost ability."

Mr. Cabot is returning to the U.S.A. and the decision on whether or not to go ahead will be taken soon after he arrives. After the meeting, he said the company—which would be known as Cabot Carbon, Ltd.—had the option on a site in the Ellesmere Port development area and the factory area would be about 15 acres. If the project went ahead, it was hoped to be ready for production in about two years. Apart from one or two American technicians, the employees would be British.

LANCASHIRE PLANT SANCTIONED

CHEMICAL and oil-refining operations at Middleton Factory, Morecambe and Heysham, which formed the subject of a local public inquiry held in July this year, are to be allowed to continue as a result of a decision made by the Minister of Health.

The factory site is used both by Imperial Chemical Industries, Ltd., and the Shell Refining and Marketing Co., Ltd. Both made application this summer for the continued use of the premises but the Morecambe Corporation opposed this on the grounds that the processes would be detrimental to planning and local amenities. The permission now given is conditional upon assurances that work coming within the scope of the Alkali (etc.) Works Act, 1906-1939 will be confined to certain areas.

REFINERY EXTENSION APPROVED

PLANS have been finally approved by the Grangemouth Dean of Guild Court for the £7.5 million extension of the existing refinery of Scottish Oils, Ltd. This will double the capacity of the plant and, it is claimed, provide the most modern type of installation in existence in Great Britain for the production of high grade motor spirit by the catalytic cracking process. Annual production from the new plant is expected to be in the region of 215,000 tons of motor spirit and 370,000 tons of heavy fuel oil. Other products will include kerosene, gas oil, and tractor fuel. Middle East crude oil is to be used, and the dock facilities at Grangemouth are being adjusted to handle the expanded traffic.

Production and Stocks of N-F Metals

THE following particulars of production, stocks, consumption, imports and exports of non-ferrous metals in the United

Kingdom in October are extracted from the monthly figures supplied by the British Bureau of Non-Ferrous Metal Statistics.

UNWROUGHT COPPER

	Long Tons	
	Blister Copper	Refined Copper
OPENING STOCKS:		
Govt. and consumers' stocks ...	37,796	85,442
Imports into U.K. ...	10,570	21,907
PRODUCTION:		
Primary ...	—	7,792
Secondary ...	1,727	5,398
CONSUMPTION:		
Primary ...	7,854	30,641
Secondary ...	—	12,776
EXPORTS FROM U.K. ...	1,236	62
CLOSING STOCKS:		
Govt. and consumers' stocks ...	39,995	80,782

GROSS OUTPUT OF MAIN COPPER, ALLOY AND PRODUCTS

	Long tons
Unalloyed copper products ...	26,507
Alloyed copper products ...	23,823
Copper sulphate ...	3,411

UNWROUGHT ZINC

	Long Tons	
	Zinc in Concentrates (estimated gross zinc content)	Slab Zinc (all grades)
OPENING STOCKS:		
Govt. and consumers' stocks ...	16,012	55,706
Imports ...	6,395	11,795
PRODUCTION:		
Virgin and remelted ...	—	5,561
CONSUMPTION:		
Virgin (incl. debased) ...	8,009	18,340
Remelted and scrap ...	—	7,280
EXPORTS ...	—	37
CLOSING STOCKS:		
Govt. and consumers' stocks ...	14,398	55,388

LEAD

	Long Tons		
	Lead in Concentrates	Imported Virgin Lead	Lead Content of English second-ary scrap and Residues
OPENING STOCKS:			
Govt. and consumers' stocks ...	—	16,324	2,253
IMPORTS ...	—	13,839	—
PRODUCTION ...	168	—	2,508
CONSUMPTION ...	168	15,445	3,553
EXPORTS ...	—	11	—
CLOSING STOCKS:			
Govt. and consumers' stocks ...	—	12,361	1,208

TIN METAL

	Long Tons
GOVT. AND CONSUMERS' STOCKS AT END OF PERIOD ...	11,624
IMPORTS ...	—
PRODUCTION ...	2,412
CONSUMPTION ...	1,882
EXPORTS AND RE-EXPORTS ...	244

ANTIMONY

	Long Tons
TOTAL CONSUMPTION OF ANTIMONY METAL AND COMPOUNDS ...	460
TOTAL CONSUMPTION OF ANTIMONY IN SCRAP ...	400

CADMIUM

	Long Tons
TOTAL CONSUMPTION OF CADMIUM ...	57.65

Undeveloped Magnetite and Lime Deposits in Scotland

THERE is an accumulation of evidence of the existence in Scotland of valuable minerals—apart from coal—to which in the past little attention has been given.

One of the latest reports in this connection is of geophysical surveys made in the islands of Skye and Tiree to confirm the existence of magnetite iron ore deposits. These were described by Prof. J. T. Whetton, head of the mining department of Leeds University, in a lecture in Glasgow to the Geological Society, recently.

Prof. Whetton, who directed the surveys, said his party found 20 hitherto unknown patches of magnetite. In Tiree, a concealed belt of rock rich in magnetite, and possibly 13 to 20 feet wide, was traced across the island from north to south. In an area

west of Broadford, in Skye, he said, an intrusion of tertiary granite surrounded by limestone of the Cambrian age was found.

In a report just issued, the building materials committee of the Scottish Council (Development and Industry) states that Scotland need have no fear of a shortage of lime for building and other industrial purposes if suitable action is taken. Scottish lime has hitherto been rather disregarded in favour of lime from England. The investigations, which took place in Mid and East Lothian, Banffshire, and Inverness-shire, have persuaded the committee that the limestone in these areas was capable of producing building and industrial lime which could take its place in competition with English limestone.

ITALIAN ALUMINIUM

Restoring the Industry Without Bauxite

THE persevering attempt that is now being made in Italy to build up once more the production of aluminium metal has in view the creation for the first time of a completely independent industry. Until the early 'thirties, all the aluminium plants in operation in Italy had been built by foreign capital—mostly American and Swiss. It was not until the Fascist programme for autarchy provided stimulus that the big Italian industrial and chemical concern of Montecatini took up aluminium production on a large scale and built a number of important factories. In a surprisingly short space of time the relatively new industry had made such headway that production soon increased fivefold and shortly before the war Italy's share of the world output—665,000 tons a year—represented 5 per cent.

Without Fuel and Power

The political forces which had given impetus to the industry were involved in its partial destruction during the war, most of the ground gained being lost, in spite of the country's desperate need for the metal indispensable for aircraft production and a number of other wartime uses. The complete breakdown of electric power supplies, caused by Allied bombing, as well as lack of fuel, forced many of the aluminium plants to close. The end of the war saw Italy's aluminium industry thrown back almost to its starting point: the country's share in world production had tumbled to 1 per cent.

Intensifying other difficulties caused by the war and its aftermath the bauxite deposits of Istria, which had provided about 70 per cent of the bauxite used in Italian plants, had been lost to Yugoslavia.

During post-war reconstruction, Italy's main hopes in the aluminium field have come to centre around Monte Gargano, at the heel of the Italian "boot," and the province of Campania, surrounding the city of Naples, where, in 1946, experts discovered bauxite deposits of such vast proportions that, once fully exploited, they should cover the needs of Italy's industry, even on a scale very much larger than they have yet reached.

An abiding problem, particularly severe in a country without substantial coal or oil, is the need for big quantities of fuel for the calcination of the argillaceous earth. The discovery of large subterranean strata harbouring natural gas in the region south of Venice has, however, recently encouraged hopes of substituting this gas for imported coal and naphtha.

As to raw materials, there are some well-founded hopes of replacing bauxite by leucite, a mineral abundant throughout Middle Italy. Up to now no satisfactory process has been found to extract aluminium from leucite, except at prohibitive costs, but Italian experts believe that in the near future a satisfactory method will be produced. If this can be done the country's needs would be covered for at least a century.

Search for Bauxite

Meanwhile, Italian producers still depend on bauxite, and, deprived of the Istrian deposits, have to import the material from there until home deposits have been fully exploited. The treaty of commerce signed between the two countries late in 1947 provides for 100,000 tons of Yugoslav bauxite to be delivered to Italy. Jugoslav does not possess sufficient aluminium plants to handle more than a fraction of the bauxite extracted from her soil and is very willing to export most of her production.

Although Italy's home consumption of aluminium products is low (about $1\frac{1}{2}$ lb. per capita annually), production has not yet sufficiently recovered to supply the country with the 35,000 to 40,000 tons a year it needs. That has impelled the Italian Government to authorise imports of aluminium bars, wire, sheets and tubes, mostly from Canada, and some from the U.S.A., Great Britain, Hungary and Switzerland.

High Prices

The granting of import licences for aluminium and aluminium products, however, is considered as a temporary measure and will stop as soon as home production once more covers the nation's needs. Meanwhile, the price of Italian aluminium is one third higher than the world market level. Not only is there no prospect that Italian aluminium will successfully compete abroad, but the industry would lose even its home market should imports be admitted freely.

Competent judges of the situation are confident, nevertheless, that within the next few years Italian manufacturers, by modernising plants and rationalising production methods, will be able to bring down costs by such a margin that the home market will need no further protection.

Leeds Office Opened.—Northern Aluminium Co., Ltd., has opened a branch office at 27 Park Row, Leeds 1, under the management of Mr. F. Layton.

Standardised Screw Threads

Basis of Recent International Pact

THIRTY years of effort between government representatives and industry of three nations were concluded by the recent signing in Washington of an accord between Great Britain, the United States and Canada on the standardisation of screw threads.

The agreement was based on the recommendations of the Interdepartmental Screw Thread Committee of the United States and of the British Standards Institution, the Canadian Standards Association and the American Standards Association.

Signatories representing the United Kingdom were: Mr. T. R. B. Sanders, Ministry of Supply; Mr. Percy Good, director, British Standards Institution, and Sir F. Ewart Smith, representing British industry.

The significance of the pact is that it will ultimately make interchangeable between the three nations machine parts and their components.

The three principal characteristics of screw threads are: angle and form of thread; pitch (the combination of diameter and number of threads per inch for the various thread series), and limiting dimensions (the manufacturing tolerances and allowances) for each grade of thread fit.

Uniform Thread Angle

The British system was based on a thread angle of 55-degrees with a thread form having round crests and roots, while America used a thread angle of 60-degrees, the thread form having flat crests and roots.

The present unification agreement provides a 60-degrees angle and a rounded root for screw threads. The crest of the external thread may be flat, as preferred in American practice, or rounded, as preferred by the British. The number of threads per inch for the various series of thread diameters has been unified, and limiting dimensions for three grades of fit agreed.

Marking the beginning of the realisation of the accord, purchases by the three Governments will be based on the new standards. Changes in normal industry are bound to take some considerable time, involving as they do considerations of engineering, design, tooling and production.

Other important types of screw threads remain to be standardised, and in the case of Acme and Buttress threads, the unification has reached an advanced stage. Furthermore a co-ordination of drawing room practices is essential if blue prints and production drawings are to be interchangeable between countries. These matters continue to be a basis of discussion.

British Casting Process

Public Showing in New York

CASTINGS made in the United States by the British-developed centrifugal casting process were on view for the first time at the National Power Exposition held recently at the Grand Central Palace, New York City.

Originally used for the production of strategic parts for aircraft during the war, the process has proved to have many additional uses in the output of power equipment, says Mr. William H. Worrirow, president of the Lebanon Steel Foundry, Lebanon, Pennsylvania (holders of the U.S. production rights).

Noting the rapid development of the process, he said that it was meeting increasing requirements for carbon special alloy and stainless steel alloy castings of equipment for the oil, textile, chemical and paper industries as well as among producers of jet engines.

Considerable expansion of facilities for the process has been undertaken at Lebanon, and Mr. Worrirow predicted its widespread application to meet the needs of American industry.

WORLD POWER CONFERENCE

THE theme of the fourth World Power Conference, to be held in London from July 10-15, 1950, will be "World Energy Resources and the Production of Power." The headquarters will be in the building of the Institution of Civil Engineers, in the main hall and library of which technical sessions will be held, as well as in the halls of other institutions. The offices of the British National Committee of the Conference are at 201-2 Grand Buildings, Trafalgar Square, London, W.C.2. (Telephone: Whitehall 3966).

The programme provides for the submission of single reports from each of the national committees, (a) a survey of the energy resources of the country, comprising solid, liquid, and gaseous fuels; water power; raw materials for atomic energy; and other resources; and (b) an historical record of the development of the resources of the country and of prime movers for utilising them, covering the period since the First World Power Conference in 1924.

Papers contributed to Division II are expected to deal with the various processes of specialised preparation and refining of fuels and Division III papers with trends in the design of large electrical power stations and the determination of their most economical location.

Absorption and Desorption of Carbon Dioxide

Fresh Data Derived from Small and Large Plants

VALUABLE original observations of the absorption of carbon dioxide in packed towers, and some conclusions significantly modifying conventional assumptions were contained in a paper presented at Manchester on December 11 to the North-Western branch of the Institution of Chemical Engineers. The speaker was Mr. F. P. Rixon, M.Sc., A.R.C.S., who dealt with "The Absorption of Carbon Dioxide in and its Desorption from Water using Packed Towers."

Mr. Rixon has investigated the subject on pilot and commercial plants. The mean values of the overall coefficients of mass transfer were related to the volume of the tower and to the logarithmic mean values of the concentration of the gas. The system deviates from Henry's Law. The author illustrated the inconsistency of the results of previous work and favoured the type of formula used by Scheibel and Othmer.

The pilot plant absorbed compressed "fermentation gas," 60 per cent carbon dioxide and 40 per cent hydrogen by volume, in water contained in a steel tower packed with stoneware rings. This water then flowed to the top of a regenerating tower up which air containing carbon dioxide passed and escaped.

Gas and water flows were measured and the gases analysed for their carbon dioxide content at different points up the absorp-

tion and desorption towers. The results were used to obtain values of the overall liquid coefficients of mass transfer of carbon dioxide between sampling points of the towers. It was suspected that true samples of the gas at any cross-section were not always obtained, as some values for the coefficient were inconsistent.

The coefficient for the absorption tower was very much higher between the gas inlet and the second sampling point than anywhere else. It was concluded that the coefficient varied with both gas and water rates. For the desorption tower it was found that the coefficient was independent of the air velocity and varied as the water flow.

The large plant worked with a high pressure of gas and with less carbon dioxide in the gas. Sample points were at the gas inlet and outlet of the absorption tower. The flow of water was measured and the gas rate was calculated. The variation of the mass transfer coefficient with gas and water rates was confirmed.

The results were correlated by the type of formula favoured by Scheibel and Othmer but the constants in the formula were smaller for the large scale absorber than for the pilot plant. In the desorption plants, the constants determining the gas and liquid film resistances were smaller than for the absorption process.

Revived Scientific Research in China

REMARKABLY good progress is reported to have been made in the rehabilitation of the principal academic and research institute maintained by the Chinese government, the Academia Sinica, first formed in 1928 by Dr. Sun Yat-Sen, "father of the republic." The Academia, which has developed greatly since its inception, now has 13 institutes devoted respectively to mathematics, astronomy, physics, chemistry, geology, zoology, botany, meteorology, history and philology, social sciences, medicine, engineering, and psychology.

Many of these institutes suffered badly during the Sino-Japanese war when equipment in laboratories and buildings was either damaged or removed, but most have since been rebuilt and re-equipped.

Among the most notable for its research work is the Institute of Chemistry in Shanghai. The work has followed a few selected lines: (1) ultra-violet absorption spectra of

simple polyatomic molecules, especially those of the symmetrical type; (2) syntheses of compounds related to the sex hormones and the chemistry of fused ring systems; (3) chemistry of the santonins; (4) extraction of alkaloids from medicinal herbs native to China and the study of their chemical composition.

Work now in progress is limited by the existing facilities, but the following studies are now being carried out: the mechanism and kinetics of the reaction of alcohols, aldehydes and ketones with hypoiodite solutions; phosphates from various sources and the mechanism of their action; the applicability of the Hofmann reaction; the preparation of local anesthetics; extraction of alkaloids; effect of various ions on the determination of sulphate; the determination of tungsten; electrodeposition of metals, and determination of uranium in columbium and tantalum ores.

BENZOIC ACID MANUFACTURE IN GERMANY

Dual Purpose Plant at I.G. Farbenindustrie

WHILE the work of all the BIOS teams investigating scientific affairs in Germany has all been valuable the yield has varied very greatly, judged from the standpoints of the scientific and industrial audiences in this country. Very near the top category in its clarity and comprehensiveness is the report prepared under the leadership of Dr. W. D. Scott, on the manufacture of benzoic acid in Germany.* The text and the diagrams of plant layout make this a very informative offering.

A Catalytic Converter

The manufacture of benzoic acid and benzaldehyde in Germany was solely undertaken by the I. G. Farbenindustrie at two plants in Ludwigshafen and Urdingen, using phthalic anhydride as raw material at the former, where the anhydride was the main product. By means of a catalytic decarboxylation converter—which could be bypassed when not required—benzoic acid was obtained from the same plant. Three different processes appear to have been used at Urdingen: as a by-product of the benzaldehyde plant (side chain chlorination of toluene); dichromate oxidation of toluene; and air-oxidation of toluene. The last-named seemed likely to supersede the most costly dichromate process which, however, was still retained for production of *p*- and *o*-chlorobenzoic acids from chloro-toluenes. Most of the benzoic acid produced was neutralised and sold as the sodium salt.

The simultaneous decarboxylation and reduction of phthalic acid to benzaldehyde, referred to in the I. G. Farben research reports, had not apparently been tried on a production scale, and although it appeared that research had been done on the preparation of benzaldehyde from benzene and CO, no relevant reports could be found.

Yields of 80 per cent theoretical were obtained by liquid-phase air oxidation of toluene in presence of a soluble cobalt salt. One plant was producing 90-100 tons per month of sodium benzoate, and another was under construction for 150 tons. Air is bubbled through toluene containing 0.1 per cent cobalt oleate, at a temperature of 140°C. and under pressure of 2 atmospheres. Water, formic acid and CO₂ are removed as the benzoic acid content builds up to 50 per cent in about 30 hours.

At this stage the acid is washed out with

sodium carbonate solution, the resulting benzoate solution being purified with activated carbon and drum-dried. The by-product benzyl benzoate recovered from the toluene recovery still is saponified to sodium benzoate and benzyl alcohol. This benzoate amounts to about 7 per cent reckoned on the benzoic acid produced, and is due to a side reaction not yet formulated. Operation flow-sheet is shown in Fig. 1 and plant layout in Fig. 2 (pp. 8 and 9 of the original). Cost is calculated to be 55.94 marks per 100 kilos acid. The catalyst is prepared from linseed oil, *via* linoleic acid and cobalt carbonate in toluene solution. Another by-product is benzyl alcohol, to the extent of 3 parts per 107 parts benzoic acid from 100 parts pure toluene. Manganese salts were found inferior to cobalt catalyst. Other salts had also been tried, including cobalt naphthenate, use of which was only discontinued because of the supply position. The toluene must be 98 per cent pure, free from pyridine bases, and of low sulphur content.

This toluene oxidation plant is relatively new—certainly less than 10 years old. It has four reactor units working, and a fifth, brick built, of double the capacity of the other four, had been built, but at the time of the visit (August, 1946) was not in use.

Sodium Benzoate

In the process of oxidation of toluene with sodium dichromate, sodium benzoate is produced continuously in 92 per cent theoretical yield, at the rate of about 200 tons per month. A 33 per cent solution of benzoic acid in toluene and a 34 per cent sodium dichromate solution are intimately mixed as they are pumped through a series of autoclaves, at a temperature of 300-310° and a pressure of 200 atm. The residual dichromate is reduced with formaldehyde, and, after cooling, free toluene is distilled off.

The separated chromium hydroxide is filtered from the sodium benzoate solution, and this latter is carbon-treated before passing to the drum drier. The time required is about 15 minutes for the solution mixture to pass through the autoclaves. The heat of reaction maintains its temperature (of 300°C.) after initial heating.

A pure grade of toluene is used, but the sulphur content is less important than with the air oxidation method. The sodium dichromate is 60-70 per cent solution strength. The sodium benzoate solution

* BIOS Final Report No. 1786 is published by H.M. Stationery Office, London, price 5/6 net. Small 4to, 45 pp., with the usual warning about patented material.

obtained must be water white and have only a slightly alkaline reaction. The crude benzoic acid used was obtained from Ludwigshafen where, as already stated, it is a by-product in phthalic anhydride manufacture. The plant layout is shown in the report's Fig. 3 (p. 18).

This is actually on a pilot scale originally used for the manufacture of 30 per cent sodium benzoate solution, and afterwards modified by addition of a further autoclave and some slight re-arrangements to make chlorobenzoic acid in crystal form. No novel features were seen.

The reason for using such a complicated form of heat exchanger is not clear, but continuous operation in the four units was quite successful. The yield was 145 parts sodium benzoate from 100 parts pure toluene (92.5 per cent theoretical), and the cost, of which detailed items are given, was 70 marks/100 kilos, after substantial credit allowance for by-products.

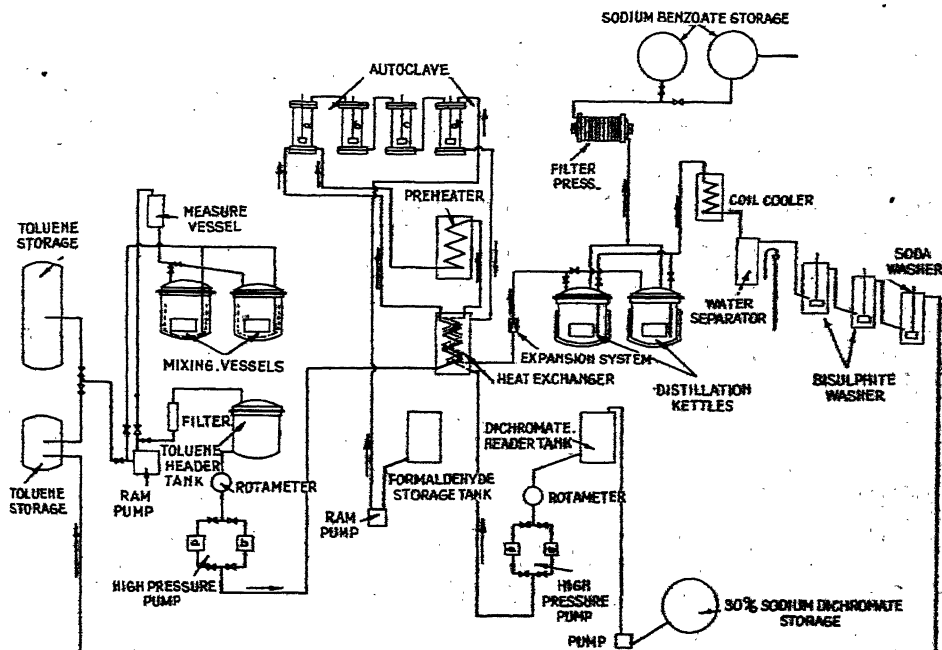
Benzaldehyde is still prepared by the well known method with hydroxylation of benzal chloride. Benzoic acid is formed at the same time from the benzotrichloride present. Plant capacity is about 35 tons benzaldehyde and 15 tons benzoic acid per month. Chlorine is bubbled through toluene, which is first heated to 100°C.

rising to 145°C. at the end of the reaction which normally takes up to 110 hours, although sometimes less (72 hours is mentioned in the text).

The mixture then consisting mainly of 65 per cent benzal chloride and 35 per cent benzo-trichloride is run into 76 per cent sulphuric acid at a temperature of 65°C. After dilution, benzaldehyde and benzoic acid separate as oily layer with unreacted material. On neutralising with soda ash the whole is steam distilled, followed by fractionation to yield pure benzaldehyde. Benzoic acid is recovered from aqueous residue by acidifying with HCl. The use of phosphorus trichloride as catalyst has been discontinued. The amount of toluene per charge is 4.4 tons (metric).

Hydrolysis is done in two stages, the first acid and the second alkaline. For a charge of 6300 kg. chlorinated product is added to the saponifier in 18 separate batches, 1000 kg. of sulphuric acid containing 10 kg. iron powder being used. After 15 hours water is added, the mixture allowed to stand, the supernatant layer blown into the alkaline saponifier, and the lower liquor-spent acid run to waste. This saponifier contains 1300 kg. soda ash and 1300 litres water.

The flow-sheet is shown in Fig. 4 (p. 29)



Dichromate oxidation process for production of sodium benzoate

the original). The output per month was 90 tons benzaldehyde and 60 tons benzoic acid. At the time of the visit the process was out of balance, the chlorination capacity being in excess of that of the saponification and distillation stages. The loss of toluene is about 6 per cent. The cost of each product was about 85 marks per 100 kg.

As already stated, by having a catalytic converter in the phthalic anhydride plant, this latter can be adapted for production of benzoic acid. This was done at Ludwigshafen in two units of 100 tons/month each. The yield on naphthalene is about 76 per cent theoretical.

A Water Suspension

Gases from the phthalic anhydride converter, sufficient water vapour being present, are passed through a catalyst bed consisting of zinc oxide and alumina on pumice. The benzoic acid/air mixture passes through a heat exchanger to a series of coolers previously described in BIOS Final 1597.

The crude solid benzoic acid containing naphthoquinones and phthalic anhydride is treated as a water suspension with sodium bisulphite in a Nütsche filter, and the wet material is then fed to a centrifuge and washed free from electrolytes and sodium phthalate. This crude material is used as such, sublimed, or sent to Urdingen for sodium benzoate manufacture.

Catalyst Consumption

The decarboxylation is not exothermic and additional heat to keep the temperature in catalyst bed at 340° is supplied by air blown from electric heaters. The catalyst consumption is 14 kg. per 100 kg. benzoic acid, and the average life of the reactor is one month. The presence of iron and its oxides must be avoided as they act as catalysts to produce some benzene in the product, and this also happens if the temperature exceeds 340°. The cost is calculated at 72 marks/100 kg. Flow sheet for purification materials is shown in the report's Fig. 5.

The report contains five appendices:—

1. List of German personnel interviewed;
2. Bibliography of published reports;
3. List of drawings from I. G. Farbenindustrie, Urdingen;
4. List of drawings from I. G. Farbenindustrie, Ludwigshafen;
5. Research document on benzaldehyde manufacture from Records Building of Control Office USFET, Griesheim.

The original documents and drawings can be inspected at the Technical Information and Documents Unit, 40 Cadogan Square, S.W.1.

Nitric Acid Process

New Italian Method Outlined

IN their English patent No. 35138/1947, P. Guareschi, L. Pettenati, and G. Maragliano-Busseti, of Genoa, claim an improved method for the direct manufacture of concentrated nitric acid from combustion of ammonia. The nitric gases thus produced are very dilute and require large absorption and other plant. According to the present invention, the absorption medium is concentrated sulphuric acid of 60° Bé circulating in a closed cycle which permits all the constituents to be completely used and all the heat recovered.

The hot nitrous gases from the burners, for heat recovery, are passed to a boiler in which they are cooled to facilitate conversion to nitric acid. By the same boiler sulphuric acid from the denitration column is concentrated from 55° to about 60° Bé with the recovered heat, while the residual heat is used for steam generation.

The nitrous gases then pass into a Gay Lussac-type tower, counter-current to the sulphuric acid. The nitrosyl sulphate thus produced is then heated in denitration columns by live steam from the recovery boilers, and the nitrous oxide mixture is at 100 per cent concentration. This is absorbed in water in stainless steel cylinders and the dilute and denitrated sulphuric acid is returned into cycle. Nitric acid forms in the cylinders, and by compression may be converted into fuming acid.

AUSTRIAN SYNTANS

TWO Austrian firms, hitherto producing synthetic tannins from naphthalene supplied by a metallurgical works at Linz are to take up the production of tannins from sulphite lye and phenol. The initiators claim that sulphite lye from beech wood is superior in quality to that from spruce for hide processing. The beech cellulose factory of Lenzing has a daily surplus of lye amounting to some 6000 hectolitres to dispose of, which can be done advantageously after thickening plant from Sweden is installed. Some ancillary installations may prove necessary, too, but it is thought that it would pay to do this, as Austria is expected to become an exporter of synthetic tannins in the near future.

The *Oesterreichische Kunststoff-Presswerke*, of Wels, Upper Austria, has started the production of polyvinyl chloride. The capacity of the present pilot plant is to be increased ten times, when the country will it is claimed, save some \$1.2 million from the importation of this material.

USING THE "NUCLEAR PROJECTILE"

Radioactive Tools for Investigation and Measurement

NEW important aids to investigation have been provided by isotopes, emphasised Dr. Seligman, prefacing the paper "The Application of Radioactive Elements in Industry," which he presented before the Society of Chemical Industry on December 6. In the course of a brief introductory historical survey, the lecturer pointed out that the neutron was a very good "nuclear projectile." The abundance of these projectiles within the pile rendered the production of radioisotopes a relatively straightforward process.

A wide range of radioisotopes was already available, and when the large pile came into operation in February, 1949, it would have 10 to 20 times the neutron flux; the range and activities of isotopes which would thus become available should equal those of the U.S.A.

So far, said Dr. Seligman, these materials had been little used in industry—possibly because of the lack of trained men. A recent survey showed over 2000 publications of work with radioisotopes in medicine, but only 12 originating from industry. In the use of stable isotopes, the position was slightly better.

Production and Separation

In the new pile it will be possible to obtain Na^{24} with an activity of 3.3×10^7 disintegrations per second. This is very much too high to use or to count and great dilution is therefore possible. On the other hand, sulphur has a very low specific activity, only 1 atom in 4.2×10^{16} being active as obtained from the pile. Hence, here it is worth while to separate and concentrate the active element. Since radioisotopes are chemically identical with their corresponding common isotopes, methods of separation need special attention. Most of them consist of preparation of the active isotope from other elements to aid separation. This may be

1. By the loss of a β particle after irradiation, e.g., $\text{Te} \rightarrow \text{J}^*$. The mechanism is represented $(n, \gamma) \rightarrow \beta$.
2. By the loss of a proton $\text{N}^{14} (n, p) \text{C}^{13}$.
3. By the Szilard-Chalmers reaction. This is molecular breakdown following irradiation. Thus an organic iron complex may break down, precipitating very pure active iron.
4. From fission products (which include a wide range of elements up to europium), by chemical means.
5. By the loss of an α particle.

Industrial uses may fall under the following heads. Use may be made of the ionising power or the penetrating power of the radiation, or the atom itself as a tracer.

Ionising power may be used to dissipate static electricity. So far only Po^{210} has been used. This has a half-life of only half a year and emits α particles. It has been used in the U.S.A. in textile, rubber and plastic studies. Harwell hopes soon to have mainly β emitters available for this purpose; they will

have only $\frac{1}{100}$ — the ionising power but will represent utilisation of by-products.

Sparks may be stabilised by the ionising power of radiation, for instance, in sparking plugs, but the spark voltage is not reduced.

Remote Recording

At least two systems of liquid level remote indication have been devised using Po^* . Thus, a float may be coated with the isotope and the ionisation current between this and another electrode measured. Current will decrease as the level falls, and the device can be calibrated to allow for decay. It is usable with inflammable liquids.

The penetrative power of radiation may be used as an alternative to X-rays for taking radiographs. Strong γ radiation of La^{140} may be used for this purpose.

Emitting weak β rays, C^{14} is used as a source on one side with a detector on the other side, for accurate measurement of plastic film thickness to better than 10^{-4} inches. Similarly, measurement of the thickness of sodium oleate on textile fibres prepared for finishing processes is being achieved using Na^{24} . Use of these techniques for continuous measurement of liquid densities within closed pipes has been suggested.

As Tracers

The great advantage of the use of radioisotopes as tracers is the very low limit of detection. For instance, while phosphorus cannot be detected below perhaps 10^{-6} g. (and usually worse than this), P^{32} is detectable down to 3×10^{-10} g. Thus, even with a millionfold dilution there is advantage in using it.

Investigations into the mechanism of rubber vulcanisation and into the source of sulphur in iron—whether it be from the coal or the ore—have been carried out with active sulphur.

By surface contamination of stable metals with films of radioactive ones, followed by

(Continued at foot of page 820)

Progress in Radiochemistry

A New U.S. Measuring Device

ADDRESSING a symposium of the American Chemical Society's New York section, Dr. Benjamin Schloss, of the Nuclonic Sales Company, spoke of a new device which he said excelled the Geiger counter in measuring radioactivity. He thought it would greatly facilitate the use of tracer isotopes in medical research.

Described as a "crystal counter," the new instrument utilizes a small crystal to trap and detect radiation, in place of the comparatively bulky gas chamber of the Geiger counter. The device, said Dr. Schloss, is so small that it can be inserted in the human body to measure weak radiations inaccessible to the Geiger counter. It efficiently records gamma rays.

A "Handbook of Radioactivity and Tracer Methodology," prepared by the Air Material Command of the U.S. Air Forces, and described as being "the most comprehensive work on this subject that has appeared to date," is now available to the public. This reference book is concerned not only with tracer techniques, but with some of the fundamental concepts of nuclear physics, isotope production and instrumentation.

The three main divisions of the handbook are: Nuclei and Radioactivity; Measurement of Isotopes; and Biological and Medical Applications of Isotopes. Nearly 900 pages long, it is available at \$20 per copy from the Office of Technical Services, Washington 25, D.C.

USING THE "NUCLEAR PROJECTILE"

(Continued from previous page)

sectioning and examination of sections, self-diffusion of the metals has been studied. Measurements may be made directly by counter or by autographic methods. The most sensitive method giving the clearest prints is to float the photo-sensitive layer off its film backing on to the section being studied.

Mechanism of etching of steel has been studied by the use of active carbon in the steel. Very sensitive checks of the wearing of metals (as in bearings and pistons) have also been carried out using active surface layers; and the examination of surfaces and lubricants.

Due to the Szilard-Chalmers effect, it is not advisable to rely on the composition of products from the pile. It is far safer to synthesise from the element the compounds—if these are required. In all such work practical considerations must be given paramount consideration. Activity, permissible dilution, price and health hazards are all relevant.

Indian Plastics Industry

\$10 m. Expansion Planned

EXTENSIVE schemes for the development of the plastics industry in India have been revealed by the delegation at present visiting the United States. Technicians from Great Britain and America are to be imported and an expenditure of some \$10 million is to be made before 1943.

At present, the industry in India has centres in Bombay, Calcutta, and Mysore, but it is hoped to enlarge its plastic markets which are now confined to export trade in the Middle East, Burma and Singapore.

During the war, India's plastic industry turned out component parts for telephone apparatus and bombs. The current production includes household wares and novelties, and the industry employs about 6000 men and women working a 48-hour week in three eight-hour shifts a day.

To cope with accumulation of orders several training programmes in factories have been inaugurated, while with an eye to the future development, a number of "government scholars" are studying plastics in United States schools at India's expense.

£60,000 Contract Completed

A British plastics firm, Tenaplas, Ltd., of Upper Basildon, Berks., has been responsible for equipping a new plastics industry in Mysore. The company last week completed for the Government of Mysore a £60,000 contract for designing and manufacturing 18 extruding machines with their associated equipment. The plant has now left the factory and is on its way to be erected in a factory in Bangalore.

The plant consists of four 3 in., six 2 in. and eight 1½ in. extruders with wire covering and cable equipment, conveyor and take-off mechanisms, extruder dies and nozzles, the complete equipment of the factory.

SAFE FLUORESCENT LAMPS

THE death of a research chemist, reported to have been caused by beryllium compound poisoning (THE CHEMICAL AGE, December 11), drew attention to the hazards of users of beryllium, or its derivatives.

The British Thomson-Houston Company, Ltd., has since announced that the use of beryllium compound in the manufacture of Mazda fluorescent lamps was discontinued by them two years ago when the zinc beryllium silicate previously employed was replaced by a new substance.

The change, the company says, was made for reasons of efficiency, but the new substance has no toxic properties.

DEPRECIATION AND MAINTENANCE-V

Physical Control of Chemical Equipment

By S. HOWARD WITHEY, F.Comm.A.

TO keep plant maintenance charges within limits it is advisable to exercise a suitable and systematic control of different units and sections of chemical equipment, otherwise the determination of a reliable figure of depreciation for inclusion in process costs will be extremely difficult. If unsuitable or incorrect methods of recording the original items of capital expenditure are used the valuations which are placed on certain assets for balance sheet purposes may be entirely misleading; experience has proved that unless the strictest accuracy is maintained it will be practically impossible to decide whether or not additional equipment is needed to satisfy a particular requirement.

Guard-Books

Owing to the depletion of staffs, some users of chemical plant have fallen back on the old guard-book method of recording purchases. After being checked and passed for payment, the invoices received from the suppliers are folded and endorsed and then pasted into a book, each page of which is ruled with a single cash column down the right-hand margin. The net cost prices are then extended into this column and credited direct to the respective accounts opened in the purchases or bought ledger, but the absence of analysis of the capital cost of equipment purchases prevents a reconciliation of the records with the specifications appearing in the working books maintained by the engineers and works staff.

When specialities and devices, attachments, etc., are paid for at the time of purchase, the cost prices do not usually pass through the purchases journal, but are posted direct from the cash book to the debit of the appropriate accounts kept in the purchaser's impersonal ledger, with the dates of payment and essential details. When units of plant or sections of productive equipment are acquired on a credit basis, however, the invoiced cost prices should be shown in a "capital outlay" column of the purchases book so that the correct figures can be transferred to the proper asset accounts at the end of each month.

Decisions in regard to the acquisition and installation of new or additional machines are naturally governed, to some extent, by the history and reported results obtained from the use of similar machinery previously employed on different processes. The cost of upkeep must, of course, always be taken

into account. It is highly desirable, therefore that the records made by users of chemical equipment should provide the amount and type of information that engineers and executives need. Both cash and credit purchases may fall under the same general headings in the final accounts, but, as the methods of recording the original transactions are not always identical, a system of physical control over capital assets should be instituted and maintained.

Specialised Chemical Equipment

In the chemical industries, increased production depends largely on increased mechanisation and this necessitates the constant presentation of information relating to the efficiency and economy of various types of equipment. Some grinders and mixers, for example, may be suitable for various homogenising, extracting or emulsification processes. Others may be more suitable for laboratory use or smaller requirements and may be fitted with handwheel screw and locking type adjustments to front and back rolls. The sizes of pumps may determine the limit of suction lifts or pressures and, therefore, their suitability for a particular purpose. While each unit of plant should, in theory, operate at maximum efficiency, this is not always achieved in practice. Time study engineers have to grapple with many problems to ensure the attainment of targets, and a low percentage of plant efficiency may be caused by a temporary shortage of materials, mechanical breakdowns or inadequate inspection.

Punched Cards

To be of any real practical utility, the classification of chemical equipment should be broken down to show the precise number of units of each class, and all variations which have been effected during a definite period. For all lines of information relating to particular equipment, the use of punched cards is now recognised as simple and effective, the holes being punched round the edges of the cards so that direct sorting can be used if the items are few, and coded sorting when they are numerous. An invoice, or any other original document, can be made into a unit card by the simple process of slotting, and cards can be obtained with a series of holes to represent definite numbers or values.

From a stack of cards there is no difficulty in picking out all the processes for

which a given unit of equipment has been employed, and the original records used with tabulating equipment usually consist of cards on which the information is reduced to a numerical basis, such as date, order number, operation number, hours of elapsed time, and so on. A sorting machine can be set to sort the cards on any desired basis, and the cards relating to a particular class of equipment can be run through a machine which will add the items and produce a total.

When properly and promptly maintained, plant and equipment records are a means of ensuring the greatest possible degree of economy in operation and enable the management to determine whether the number of units under a given heading is greater than is called for, having regard to capacity or the extent of the operations in hand or likely to be undertaken. In some cases, the records may show that certain processes are being retarded by the continued use of inadequate plant or by an insufficiency of the right types or sizes, and there is a good deal of evidence to support the view that

some changes can often be made to raise output and accelerate the work.

A systematic rearrangement of equipment sometimes makes it possible to withdraw certain units and reduce processing costs, and to instal and operate the remainder of the plant to much better advantage; when the records take the form of cards they can be arranged in alphabetical or any other convenient sequence. In this way, the computation of the amounts to be charged against the operations and included in the costs under the heading of depreciation is materially facilitated, and, there can be little doubt, that when loose plant, attachments and special devices are subjected to physical control on the part of the management, much more satisfactory results can be obtained than is possible when there is no organised attempt to exercise a check over the various assets employed in the business.

Plant and equipment records are also the means whereby claims in such matters as fire and other insurances can be readily settled and tax assessments substantiated,

CHEMICAL PLANT RECORD

FURNACE

Description :
 Location :
 Maker's Name and Number :
 Operating on :
 Auxiliary Apparatus :
 Internal Chamber Dimensions : Working Length.....ins. Width.....ins. Height to Crown.....ins.
 Length from Back Wall to Inside Door : ins.
 Working Range : deg. Cent. Suitable for :

Date	No.	Cost			Remarks
		£	s.	d.	
19					
	Acquisition	...	...		
	Transport ...	...	...		
	Installation	...	...		
	Auxiliary ...	...	...		

(Back of Card)

Value as at	19				Date	Ref.	Repairs, Adjustments etc.	£	s.	d.
Less Depreciation written off	...	...	...		19					
Reduced book value	...	...	...							
Additions	...	...	...							
Value as at	19									
Less Depreciation written off	...	...	...							
Reduced Book Value	...	...	...							
Additions	...	...	...							
Value as at	19									
Less Depreciation written off	...	...	...							
Reduced Book Value	...	...	...							
Additions	...	...	...							

Small-Scale Water Treatment

HOT water for wash basins and similar purposes is commonly supplied from small tanks or cylinders in which the water has been heated by the direct injection of steam, and this, when manually controlled, is apt to be extravagant and expensive. There are very many such installations in the chemical industries. Automatic control of the steam supply, governed by water temperature, is, of course, highly desirable, provided the system is not too expensive by relation to the frequently small capacity of the tank.

Constant Circulation

A device which is claimed to have been designed especially for just this purpose is the "Thermocirc," made by Sarco Thermostats, Ltd., Cheltenham. This is little more than 10 in. long by 3 in. wide, and is readily fitted to the outside of any existing small tank or vessel where there is a steam supply. While it mixes steam and water, it is more than an ordinary steam and water mixer, being different in this important respect: instead of the hot mixture being drawn directly from the mixer, there is constant circulation through the tank and the mixing chamber of the device, and the draw-off is from the tank. This principle is claimed to eliminate operational complications.

It should be noted that the "Thermocirc" is not an instantaneous heater, so it is best used in conjunction with a storage tank of ample capacity to meet peak demands for hot water. The device provides hot water with the simplicity of direct steam injection but without the waste which is associated with the uncontrolled admission of

steam into the water; it is claimed. A less common but interesting application of the device is on certain types of water-jacketed vessel, such as are found in some food processes and in chocolate processing.



The "Thermocirc," an entirely automatic device for obtaining hot water by the direct mixture (within itself) of steam and cold water, for installation on small tanks and on water-jacketed vessels. While steam is being admitted at A, cool water is pulled from the tank into the device at B, heated, and returned hot into the tank at C.

(Courtesy of Sarco Thermostats, Ltd.)

Simplified Process for Removing Ionised Solids

A REDESIGNED Filt-R-Stil cartridge demineraliser for delivering a low-cost chemical substitute for distilled water, without heat and at a maximum rate of ten gallons per hour has been announced by the Ion Exchange Products Department of the American Cyanamid Company, New York, N.Y.

The new unit consists of three principal parts: (1) a disposable cartridge containing Cyanamid's Ionac ion-exchange resins, the synthetic agents which remove dissolved, ionised solids; (2) a bracket or support for the cartridge; and (3) an electrical conductivity indicator, which shows the quality of all treated water and indicates when the cartridge is exhausted and needs replacement. Improvements have been made in the indicator which now shows continuously the

quality of treated water. The unit requires only two watts of electricity.

The water delivered by the cartridge unit is guaranteed to contain no more than ten parts of dissolved ionised solids per million parts of water, exclusive of silica. The rated capacity of the cartridges is 1100 grains (as CaCO_3) and one cartridge will produce at least 550 gall. of demineralised water from a supply containing 2 gr. per gall. of dissolved solids. The unit can be operated either continuously or intermittently.

Chemical Society's Library.—The library of the Chemical Society will be closed for the Christmas holiday from 1 p.m. on Thursday, December 23, until 10 a.m. on Wednesday, December 29.

NEW ENTERPRISES IN SOUTH AFRICA

Widening Field of Chemical Technology

From Our Special Correspondent

BENMAR Holdings, Ltd., Johannesburg, is the promoter of the plan to provide in South Africa by 1950 a large-scale industry for the production of fertilisers and other products from low-grade coal. There have been reports of the associate company that is to undertake this work having a capital of £8.5 million, which is large by current standards in the South African market. Reports speak of the provision of plant and equipment worth £4 million and a factory occupying much of a 60-acre holding. A lot of the equipment is expected to come from the Italian combine Chemigas. Provisional estimates suggest that the annual output of the factory will be 4000 tons of ammonium sulphate, 53,000 tons of ammonium nitrate and 20,000 tons of fixed nitrogen. There will be a number of other chemical products. Recalling that African Chemical Industries and Explosives also proposes before long to supply the bulk of South Africa's fertiliser requirements this new factory seems to be planned on unexpectedly ample lines.

* * *

A liquid preparation for waterproofing and acid-proofing brick, concrete, stone, plaster, wood and fabrics has been developed by a Johannesburg firm. The preparation requires no special handling and can be applied by spray or brush. It is claimed that the preparation will not discolour any surface, that it has no chemical activity, so that the preparation is a versatile undercoat for all types of finishes.

* * *

The company which is undertaking to produce liquid fuel and oil from coal in the Vereeniging area is expected to reach an output of 80 million gall. of petrol and 10 million gall. of diesel oil a year, according to the recently issued report of the Coal Commission. The commission was told that it has been estimated that the Union's annual petrol consumption by 1966 will be 550 million gall. In 1946 imports amounted to about 200 million gall.

* * *

It is announced that the new South African factory of Associated Lead Manufacturers, Ltd., at Durban, should be ready for production in the middle of 1949. The up-to-date plant will produce various lead products for paint factories, battery manufacturers and others. The technical side of the work will be undertaken by British experts, who will introduce the latest methods

Many insecticides imported into the Union have their own spreaders and adhesive materials already incorporated. This is almost invariable in the case of the formulations of DDT and benzene hexachloride. Some manufacturers, however, continue to sell the stickers and wetting agents separately. An application for such spreaders to be admitted free of duty was made on behalf of a special chemical mixture called "Grasselli Spreader," which, it is stated, cannot be used for any other purpose than mixing with insecticides. The authorities are noting, however, that simple mixtures may also be used for this purpose, such as a mixture of soap and paraffin. It is considered that spreaders approved by the Minister should be placed on the same basis as the insecticides.

* * *

A thermal and acoustic insulating material, of which the basic raw material is cellulose acetate, is now being manufactured by a firm recently established in Port Elizabeth. The corrugated multi-laminar construction of the material not only provides an air-layer insulation with a high thermal efficiency, but also ensures resiliency and light weight—12 oz. per cu. ft. Complete freedom from absorption of moisture, gases or odours, freedom from dust or other irritants, high resistance to rot or corrosion and free drainage of condensate are among the useful characteristics claimed. It can be cut with a knife and bent to fit curved surfaces and will withstand temperatures up to 180° F.

* * *

Fireworks used in South Africa are now being made in Cape Town. The company responsible has been established in South Africa for 50 years, but only during the past 18 months has it engaged in the firework industry. Very little of the work is mechanised, but it is expected that next year the company will put about 16 times in production. Demand has been good, although British fireworks still comprise most of the trade, which is worth about £250,000 a year to merchants.

* * *

Cellulose lacquers for spraying, brushing and heat treatment, thinners, polishes, waxes and plastic wood are now being produced at Somerset West, near Cape Town, by African Explosives and Chemicals.

Replacing Fertilisers

Spain's Inadequate Nitrogen Supplies

VARIOUS estimates have been made of the world shortage of fertilisers for 1948-9. Among others, the Spanish journal *La Hacienda* has recently stated that for 1947-48 the demand was 30 per cent above supply, and the deficit will probably be as much or more for next season. The position in Spain is indeed worse than this. Before the war that country used about 450,000 tons of ammonium sulphate and 130,000 tons sodium nitrate, practically all of which—except about 5 per cent of the sulphate—had to be imported, mostly from Germany, England, and Chile.

Although Spain is not represented on the International Emergency Food Council, it appears that the following allocations of exports have been made to Spain in 1948-49.

From	Tons
Italy, Belgium and U.K.	94,050 am. sulph.
Chile	112,500 sod. nitrate
Norway	12,000 Na and Ca nitrate
Home production	22,500 am. sulph.
Total	341,050

Even these are only on paper, "paper results" and in view of the many international difficulties, it is only too likely that they will not be realised.

Green Manuring

An anonymous writer in *ION Revista Españ. de Quím. Aplic.* for October, 1948, while admitting the existence of serious shortage, urges farmers and fruit growers to substitute green manures, by ploughing in suitable crops, and to consider the possibilities of synthetic farmyard or other organic manures. Stock farming has declined substantially in Spain in recent years.

Good Results Claimed

The writer uses to strengthen his argument for dispensing with chemical manures the results of field tests undertaken by large growers in Pals (Prov. Gerona). Here the rice crop normally requires large amounts of nitrogen—up to one ton of ammonium sulphate per hectare (2.47 ac.). In the experiments plots of 4 ha. green manuring were tried with rice or other crops, and in the case of the former, the yields are said to have been better than with ammonium sulphate. Use of the latter is being restricted only to the nurseries.

The crop sown for green manure was not always the same legume, but various kinds were tested. The experiments are being continued this year with wheat and other crops in Ciudad Real.

French Chemical Shortage

Continued Effect of the Strike

THE French chemical industry continues to suffer from the aftermath of the strikes, lack of power and coal having forced cessation of some departments of production. Everywhere stocks have been seriously lowered, but some raw materials, including pyrites, sulphur, phosphates and other minerals have not been short; potassium chloride, the extraction of which stopped for some time, has begun to arrive again.

In sulphuric acid production, the slowing down enforced by lack of fuel has meant that demands cannot be satisfied. In other departments, such as phosphate manures, little difficulty was experienced, although nitrogen manures suffered from stoppage of ammonia production. This also diminished nitric acid production and consequently the output of explosives and dyeing materials.

Other materials which have become scarcer for the same reasons include chloride, chlorates and chlorinated derivatives, sodium sulphate, sulphite products and chromium salts. Sodium sulphide is now more abundant and control of its sale has been lifted. Zinc oxide production is limited by lack of raw materials and titanium oxide, and dyes are still rare. Some organic products are being held up by the seasonal shortage of ethylic alcohol and there are difficulties in production of ethylene derivatives.

New Fungicide

Possibility of Wide Application

REPORTS in the U.S.A. on the new chemical, a synthetic product called echridine, claimed that it is highly effective against the fungi which are responsible for losses of food crops, decay in lumber, mildewing of fabrics, leather mould, and rot to tents, tarpaulins and ropes.

Echridine is synthesised from pyridine compounds which are recovered from the coke oven gases of steel mills. Pyridine itself, once a waste product, has been used in recent years in the manufacture of waterproof cloth and synthetic rubber.

Laboratory tests of the new chemical are stated to have proved it to be effective against fungi even when diluted to a strength of one part in 150,000 and Dr. F. E. Cislak, director of research of the Reilly Tar and Chemical Corporation, Indianapolis, Indiana, announces that clinical tests are now being conducted to determine its therapeutic value for human use.

Canadian Chemical Review

Dominion Developing New Plants and Processes

From Our Own Correspondent

NORTHERN CHEMICALS, LTD., a division of the Lithium Corporation of America, announces that it will start construction of a concentration plant for lithium carbonate next spring at Cat Lake on the Bird River, about 75 miles north of Winnipeg, Manitoba.

* * *

The Chemical Institute of Canada states that it will commence publication of its own monthly technical and news magazine, *Chemistry in Canada*, next April. It also announces that Dr. S. A. Beatty, of the Fisheries Experimental Station at Halifax (N.S.), has been appointed chairman of the 1949 conference committee, which will function under the guidance of the director of national meetings, Dr. D. M. Morrison, of Montreal.

* * *

Two Dominion government chemists, endeavouring to perfect a formula for production of uncontaminated tannin from western hemlock bark, have predicted an export industry for British Columbia worth \$5 million annually. Dr. Joseph Gardner and Harold McLean, graduates of the University of British Columbia, state that they intend trying a newly developed technique for demineralised solutions. The process would remove a salt contamination which enters the bark while the logs are being floated to sawmills in coastal waters. If the process proves successful, 10 to 15 per cent of tannin can be removed from the hemlock bark, providing an annual production of 15,000 tons. "The United States now imports two-thirds of its tannin needs," said Dr. Gardner, "and Canada gets almost all its tannin from abroad."

* * *

Said to be one of the best equipped chemical plants of its kind in the world, a \$1.25 million sulphuric acid processing unit, has been officially opened at Hamilton, Ontario, by Canadian Industries, Ltd. The plant replaces older type sulphuric acid production equipment and will turn out daily approximately 250 tons of acid in varying strengths. The compact structure is known as "a buildingless" plant as most equipment is outdoors. Steam generated in processing the sulphur supplies heat required in the manufacturing process and for the small adjacent building housing the control panel and change room for employees. "While persons rarely encounter acids in everyday

life, all modern industry depends directly or indirectly on sulphuric and other common acids," said Dr. H. G. Littler, manager of C.I.L. chemicals group, at the opening. Metallurgical processes consumed many tons of sulphuric acid in steel mills; that the acid's "unglamorous but indispensable" properties helped to produce a host of materials and even radium.

* * *

Titanium, produced under processes resulting from the research of their consulting metallurgist, Dr. L. M. Pidgeon, is now being turned out by Dominion Magnesium, Ltd., by a pilot plant, and small deliveries are being made. The company's new extrusion plant at Haley, Ontario, is nearing completion and is expected to be in operation towards the end of next month.

* * *

Alleged violation of patent contracts on the Gyro processes in vapour phase oil cracking is the cause of a \$36 million lawsuit being brought by the Chemical Research Corporation against the American Locomotive Co. The corporation has previously contested and won other suits on violation of their Gyro patents, which are important in the manufacture of synthetic rubber.

* * *

Canadian Industrial Alcohol Co., Ltd., showed an increased profit for the year ended August 31, 1948. A plan of modernisation and rehabilitation at the company's Corbyville plant has recently been undertaken, including the erection of a continuous alcohol still.

* * *

Widespread interest has been aroused in the report from Canada of a new process of manufacturing steel from iron ore "in half an hour" instead of 24 hours. According to *The Financial Times* special correspondent, Premier Duplessis said that he had seen the new method in operation at St. John's, Quebec. A Government official is reported to have stated that the iron ore was electrically refined, and that the process at present in the pilot plant stage, was likely to revolutionise the steel industry if workable on a large scale.

The process had been thoroughly investigated by Dominion Foundries and Steel, said a Hamilton, Ontario expert, and it appeared fairly practicable, though its widespread use would probably not be possible for a long time.

Home News Items

Air Letters to French Colonies.—The 6d. air letter service has been extended to French overseas territories. Sixpenny air letters may now be sent to all countries outside Europe to which there is an ordinary mail service.

Freer Supplies of Saccharin.—The Minister of Food announces that it is now possible to make available additional quantities of saccharin for the manufacture of pickles and sauces. Applications for supplies or augmented supplies of saccharin are invited by the Ministry of Food, Preserves Division, New Marston, Oxford.

BBC May Blacklist "Phenobarbitone."—The BBC has taken up with Scotland Yard the Pharmaceutical Society's request that names of lost drugs should not be broadcast. The society has pointed out to the BBC that the name of the drug does not help to recover it and may disclose to a patient the nature of his treatment.

Scottish Glass Sand Industry.—The progress of the Scottish glass sand industry is considered to be satisfactory, despite the revival of shipments of Dutch sand to glass-makers. The Scottish industry, which expanded rapidly during the war when there were no imports from the Continent, is shipping about 1000 tons weekly. The average iron content of the sand, .011 per cent Fe_2O_3 , compares favourably with the best Dutch types.

Best Coal Output Since 1940.—Last week's combined output of deep-mined and open-cast coal in Britain was the highest since July, 1940. It exceeded the previous week's production by 65,500 tons. Despite this, neither the 1948 target of 200 million tons deep-mined or the total target figure of 211 million tons will be reached. Comparative totals are: Last week: 4,405,500 tons (4,213,300 tons deep-mined, 192,200 open-cast). Previous week: 4,340,100 tons (4,146,500 tons deep-mined, 193,600 open-cast).

Peat for Gas Turbines.—A memorandum from the Scottish Research Committee discusses the possibility of the use of peat as fuel in gas turbines. It urges that funds should be made available at once for investigation. The committee points out that there are 2 million acres of peatland in Scotland and recommends that a team of experts be appointed to report on the best methods of utilising peat. The memorandum has been forwarded to the Secretary of State for Scotland, Mr. Arthur Woodburn, with a request that a deputation be received.

October Output Record.—Industrial production rate for October reached a new peak, according to the provisional figures issued by the London and Cambridge Economic Service. The chemical and allied trades showed a steady increase. Based on average 1946 = 100, the figures were August, 108; September, 116; October, 119.

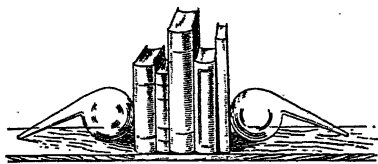
Exhibition of Radiographs.—An exhibition of industrial radiographs will be held at the spring meeting of the Industrial Radiology Group at the Institute of Physics on February 18 and 19, 1949. Intending exhibitors should apply to the Institute of Physics, 47 Belgrave Square, London, S.W.1, for entry forms.

Glasgow Gas Supply.—By a majority of four votes, the Labour section of the Glasgow Corporation reversed the decision of the Gas Committee that the Ministry of Fuel and Power should be asked to re-open the Coatbridge gasworks as a means of augmenting the city's supply of gas. It was also proposed to consider the possibility of forming a gas grid for the West of Scotland.

Surgical Research.—Lord Nuffield has given £250,000 to the Royal College of Surgeons of England for the promotion of research and education in surgical science and to increase facilities for young surgeons, particularly those from the Dominions, the United States, and other countries who come to Britain for advanced study.

Rust-proof Cars.—The first plant for production of motor-car bodies rendered rust-proof by a phosphating process which has not so far been applied to this use in any other country, is now operating at the factory of Fisher & Ludlow, Ltd., Castle Bromwich. The complete chassis, frame and body is made rust-proof and painted with primer in a dipping plant 300 ft. long, capable of treating 17 bodies an hour.

£1.5 m. Equipment for Steelworks.—The Steel Company of Wales has placed further contracts worth £500,000 with Davy and United Engineering Co., Ltd., Sheffield, for rolling mill equipment and auxiliary machinery. Some months ago a similar contract worth £1 m. was placed with the same firm. The latest order is for a four-high reversing cold mill for cold rolling silicon steel strip, designed to roll a maximum width of 42 in. (compared with the usual 24 in.) at speeds up to 1000 ft. a minute. The estimated output is up to 900 tons of silicon steel strip a week of 126 hours.



A CHEMIST'S

BOOKSHELF

An Introduction to Crystallography. By F. C. Phillips. London, 1948. Longmans. Pp. 302. Figures 500. 25s.

Crystallography has been discussed in books for the mineralogist and for the X-ray physicist, but always as a subject subordinate to the main theme. It is refreshing, therefore, to find Dr. Phillips presenting a book which deals with crystallography as a subject on its own. Such study is important for its own sake, but it is also true that it is fundamental to the examination of the internal structure of crystals and hence justifies a more thorough study than it receives. The author is a lecturer in the Department of Mineralogy in the University of Cambridge and his book is a very lucid introduction to the study of crystals. In particular, the chapters on stereographic projection and on the mathematical relationships used in calculations are outstanding for their clarity and thoroughness.

A more detailed treatment would be helpful at the beginning of the chapter on the 32 Crystal Classes, dealing with symbols which represent the symmetry elements possessed by each class. It is not emphasized that a particular class may have more symmetry elements than are expressed in the symbol as a *necessary consequence* of the elements which are used to define the class. In addition, the chart on page 106 could with advantage be supplemented by a similar set of sketch stereograms showing the symmetry elements for each class on a single page, instead of individually at the beginning of the sub-sections devoted to each class. This chapter seems, indeed, somewhat unbalanced because of the author's anxiety to give examples of crystals belonging to each class and to provide drawings of their characteristic appearance. The number of such drawings is bewildering, and the book as a whole seems to be over-illustrated, a factor which must have contributed to the high price for a volume of this size. The drawings are excellent, however, and are not readily available elsewhere; but ideally developed crystals are not so common in nature as to justify the inclusion of so many in a book which sets out to be an introduction to the subject.

The last chapter on Crystal Habit brings forward a comparatively little-used concept

to assist in assigning a particular crystal to its correct space group, in addition to the more usual methods based on morphology alone, on X-ray analysis, on piezo and pyroelectric effects and on optical activity, etc. It is admitted that there are known exceptions to the principles described and that the method should be used to add to the other evidence. The section on The Internal Symmetry of Crystals, a necessary preliminary to the final chapter, seems somewhat artificial because of the author's avoidance of the whole subject of X-ray crystallography. Admittedly, a book similar to this one is badly needed for that subject, but it is debatable whether enough could not have been introduced here to demonstrate the practical justification for the originally theoretical concepts of glide planes and screw axes as revealed by intensities and absence of X-ray reflections from particular crystals.

The book's greatest virtue is that it contains so much information collected for the first time between two covers. There can be no hesitation in welcoming it as a contribution of real value to the student and practising crystallographer alike.

The Diastases (Les Diastases). By Paul Fleury and Jean Courtois Maitre. Collection Armand Colin, 103 Boulevard Saint-Michel, Paris. Pp. 216. 150 fr.

The rapid development of biochemistry since the beginning of the 20th century and the numerous applications of its discoveries in the industrial field have attracted the attention of a wide public. The study of the diastases—those bodies which seem necessarily to preside over the unceasing transformation of which the centre is the living matter—therefore contribute one of this book's most stirring chapters. The authors, both professors at the University of Paris, concentrate on a series of researches relating to the chemistry and methods of the diastases from their beginning to the present day, and neglect none of the future aspects of the subject. Commencing with an historical survey, the book deals, in nine chapters, with the fundamental characteristics of the various types

(Continued on following page)

Railway Chemistry

Multiplicity of Research Services

AN interested audience of chemists from various regions of British Railways, and of visitors from Egypt and Denmark, assembled at the Northern Polytechnic, Holloway Road, N.7, last week to hear W. P. Henderson, chief chemist, London Midland Region, talk on "Chemistry and the Railways" at the meeting of the British Association of Chemists.

The extremely varied and increasingly numerous activities of the chemist in the railway's many undertakings were described by Mr. Henderson, who said that as long ago as 1894 a representative chemists' committee was in existence.

Unusual Requests

Illustrating the variety of demands made upon the railway chemists, the speaker revealed that among the problems recently submitted were those relating to fires, dermatitis, carriage of radioactivated zinc sulphide, the problem of lassitude in signalmen, destruction of moths and the pollution of canals.

Investigation of claims, one of the tasks carried out in the chemical laboratories, frequently resulted not only in the saving of money to the railways, but also in the discovery of an inherent weakness in the product, enabling the manufacturer to improve it. That was one of the more interesting phases of the job, which involved also routine work on a vast scale.

British Railways control more supplies of drinking water than any other single undertaking. Standard methods of sampling are laid down and a strict chemical and bacteriological examination continually maintained.

A CHEMIST'S BOOKSHELF

(Continued from previous page)

of the diastases, classified in 11 groups. Throughout the book there are extensive references to other publications, and the text is supported by 10 instructive figures and four tables. The general view which the authors present applies equally to students who wish to complete their knowledge as well as to research workers who desire to familiarise themselves with their view before approaching the subject. Nowadays, since the progress of industries as well as the study of therapeutics is dependent largely upon the work carried on in laboratories, biochemistry will interest all minds inquiring about the precise notions of the phenomena of living matter.

LETTER TO THE EDITOR

London Headquarters for Czechoslovak Chemicals

SIR,—Recently several chemical journals have published articles describing the new trends in Czechoslovak chemical industry. As stated in these articles, the organisation under which all the import and export of raw materials comes is the newly established Chemapol A.S., Prague.

It is also the main aim of this organisation to facilitate trade relations between Great Britain and Czechoslovakia. On September 1, 1948, Chemapol took over the Czechoslovak Chemical Works (London), Ltd., 35 Pont Street, S.W.1, which until then had acted as agents for the Czechoslovak Chemical Works, National Corporation. This London organisation, therefore, will now be a branch of Chemapol and the sole representative of the Czechoslovak chemical industry in Great Britain.

May we add to this information, which we were asked on behalf of Chemapol to send to the leading chemical journals, that the board of directors of the Czechoslovak Chemical Works (London), Ltd., has recently been reconstituted. Its chairman is now Dr. V. Sada (chairman of Chemapol A.S., Prague); vice-chairman, Dr. George Lewi, M.I.Chem.E., M.Inst.F.; directors, Capt. C. F. Ward Jones, Mr. David Finnie and Mr. B. Dostal (all in London) and Dr. O. Eisler and Dr. A. Lantay (both from Czechoslovakia).

The best and speediest method of conducting business negotiations with the Czechoslovak chemical industry will be by direct contact with this company, which, as indicated, exists specifically to assist such negotiations.—Yours, etc.,

GEORGE LEWI,

Vice-Chairman.

Czechoslovak Chemical Works

(London), Ltd..

35 Pont Street, London, S.W.1.

ELECTRIC KILNING IN ITALY

AN electric kiln for the manufacture of bricks has been undergoing a six months' test at a factory near Milan. The kiln is tunnel shaped, is over 200 ft. long, varies in width from 7 to 9 ft., and develops a temperature of about 1000°C. Chromium nickel elements provide the heat and two fans, one driving a hot and the other cold air serve the cooling and pre-cooling system. The plant is capable of turning out 30 tons of bricks every 24-hour shift and is reported to show a saving in labour and heating costs.

Overseas News Items

Polish Coal for Holland.—A provisional agreement between the Polish and Netherlands coal authorities provides for the delivery of 600,000 to 800,000 tons of Polish coal next year.

British Experts Aid Yugoslavs.—Mr. Murdo Mackenzie, head of a British engineering firm, has concluded an agreement to advise the Yugoslav Ministry of Heavy Industries on the design and establishment of metallurgical plants.

Augmented Ammonia Production.—Ammonia production is to be increased to 180,000 tons annually by the installation of a new coke gasification plant at Limbourg, Holland, capable of treating 60 tons of coke daily. The plant will afford 85 per cent gas output.

Scrap Metal from German Fleet.—Scrap metal from remnants of the German fleet lying at the bottom of Kiel harbour is now being shipped to Britain at the rate of 20,000 tons a month. Some 246 wrecks and sunken vessels are being recovered under the supervision of the Ministry of Supply.

U.S. Crude Oil Record.—Production of crude mineral oil in the U.S.A. in the week ended October 25, 5,595 million barrels, surpassed last year's daily output for the same period of the year by more than 300,000 barrels, states the American Petroleum Institute. It was a record total.

French Industry Handicapped.—M. Claudius Petit, French Minister of Reconstruction and Town Planning, has stated that lack of coal, following the miners' strike, would lead to the dismissal of one-third of the workers in some cement-mixing plants in Normandy.

Another Rust Remover.—A new derusting liquid called Corrosan has been produced by a German professor, Hermann Frauenfelder, formerly employed by I. G. Farben. The professor, who has been living in Sweden for four years, claims that the liquid will free metal from rust after a few hours' treatment, does not damage it, and gives off no dangerous gases.

New Dutch Oil Refinery.—It is reported that work has been commenced on a Rotterdam oil refinery which is planned for an output of 20,000 to 30,000 barrels a day. The refinery, which is owned by Caltex, is expected to be completed by 1950, and will consist of a crude distillation unit, a cracking unit and other plant for the manufacture of petroleum by-products.

Austrian Lignite.—The Salzach Kohlenbergbau G.m.b.H. is to exploit a deposit of high-grade lignite situated between Buermoss and Timelkam, Austria, the *Austria Economist* reports.

Hungary Making Insulin.—The Hungarian Chinoin factory is reported to have resumed the manufacture of insulin. An organisation for the collection and preparation of glands is said to have been established and it is intended to double insulin output by 1949.

Anglo-Finnish Trade.—A delegation from Finland is expected in London shortly for trade talks. Under the present agreement, goods include 190,000 tons of chemical wood-pulp to this country, while the U.K. is supplying Finland with 500,000 tons of coal and 40,000 tons of steel.

New Canadian Titanium Deposits.—New deposits of titanium containing ore are reported to have been found on Queen Charlotte Islands. Samples reported to have a Ti-content of 60 per cent are under examination in the University of British Columbia.

Rubber Decline.—World production of natural rubber in October was 125,000 tons, the lowest figure since last May, according to the Rubber Study Group. While the figure for the first 10 months of this year aggregated 1,247,500 tons, consumption was 1,145,000 tons, a rise of 7,500 tons having been recorded between September and October.

New Nylon Thread.—Limited production is being undertaken at the Bolding Corticelli Company's works in Connecticut, U.S.A., of a new synthetic fibre thread, "a monocord made of an untwisted bundle of nylon fibres which have been so welded together that they form a thread of one cord with all the properties of the original fibre." The "welding" process can be applied to all other synthetic and natural fibres.

Commercial Terms Defined.—In an attempt to gain international acceptance for uniform definitions of certain commercial terms, the United States Associates, representing American interests in the International Chamber of Commerce, have prepared draft definitions of "FOB" and "FAS" "C and F" and "CIF." The standardised interpretations are intended to be presented to the 12th ICC congress in Quebec next June and, if they are accepted, are likely to be the forerunners of similar definitions of a number of others widely-used commercial abbreviations.

Personal

THE directors of Thos. W. Ward, Ltd., announce that four of their local directors have now been made directors. They are MR. PHILLIP T. WARD, son of the chairman and joint managing director, MR. GEORGE STUART WOOD, son of the deputy chairman and joint managing director, MR. J. S. BRADSHAW, who has 33 years' service with the company in the scrap iron and steel department, and MR. E. G. MORT, with 24 years' service, who has been in charge of the company's activities in South Wales.

DR. ARTHUR J. BIRCH, M.Sc. (Sydney), D.Phil. (Oxon.), of the Dyson Perrins Laboratory, Oxford, has been appointed Smithsonian Research Fellow of the Royal Society for four years from January 1, 1949. The fellowship is tenable at Cambridge University, where Dr. Birch will continue his researches in organic chemistry.

DR. R. E. G. ARMATTOE, director of the Lomeshie research centre for Anthropology and Race Biology, Londonderry, recently home after his visit to the Gold Coast, said he means to compile a history of African medicine. He has brought back with him eighteen cases of African herbs and drugs for research purposes.

The directors in London of the Czechoslovak Chemical Works (London), Ltd., which it is announced (page 830) will negotiate trade between Great Britain and the nationalised Czechoslovak industry, are DR. GEORGE LEWIS, CAPT. C. F. WARD JONES, MR. DAVID FINNIE and MR. B. DOSTAL.

MR. F. E. MAER, works director, and Mr. W. ANDERSON, foundry manager, of the Glacier Metal Co., Ltd., are in America, studying industrial, managerial and technical methods employed in various metallurgical industrial plants there.

Among the six new magistrates added to the Commission of the Peace for Huddersfield is COUNCILLOR G. B. JONES, general works manager of Imperial Chemical Industries, Ltd. (Dyestuffs Division) with which he has been associated 31 years.

LORD FORRES has been elected chairman of Anglo-Ecuadorian Oilfields, succeeding MR. H. C. B. WILLIAMS.

MR. R. TALBOT CLAYTON has resigned from the joint managing directorship of Cannon Iron Foundries.

Obituary

THE death is announced, at Cambridge, at the age of 63, of DR. MARJORY STEPHENSON, a pioneer in chemical microbiology and one of the first women to be admitted a Fellow of the Royal Society. Miss Stephenson was one of the earliest to apply bio-chemical techniques to the study of micro-organisms, and her researches gained for her an international reputation.

The death has occurred at Glasgow, of MR. ROBERT WILSON MEIKLE, who for 55 years was identified with the shale oil industry in Scotland. He retired from the secretaryship of Scottish Oils, Ltd., in June, 1946, having served since 1919. He was 76.

MR. GEORGE CHARLES ROSE, of Grindon, Sunderland, works accountant with the Monsanto Chemical Works, Sunderland, collapsed and died in his office. He was 55.

BREACH WITH SOVIET ACADEMY

THE resignation of Prof. Hermann Joseph Muller, the American geneticist, from the Soviet Academy of Sciences, following the resignation of Sir Henry Dale (THE CHEMICAL AGE, December 4), widens still further the breach between the U.S.S.R. and the West in scientific contact. The Soviet news agency, which made known the resignation, reports that the Academy says that Prof. Muller had criticised recent trends in Soviet biology as leading to the support of racial discrimination, and had accused Soviet scientists of subordinating their ideas to political necessity.

In reply to the professor, the Academy said that Soviet scientists were convinced that there was no science, nor could there be any, which was detached from politics.

A.R.I.C. for an Invalid

Courage and perseverance have been rewarded. After eight years' continuous study, while able to move only his hands and arms on an invalid carriage, a former RAF sergeant, Ian Anderson, of Giffnock, qualified as an A.R.I.C. Involved in an RAF crash in 1941, Anderson suffered spinal injuries. In 1944 with support of the Ministry of Labour Resettlement and Rehabilitation officers and Royal Institute of Chemistry he became a "special" student at the Glasgow Royal Technical College. Although unable to raise his head for reading, a pair of "recumbent spectacles" helped him to spend hours over his textbooks.

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

HORNFLOWA, LTD., London, E.C. (M., 18/12/48.) November 10, by order on terms, two charges, to Newcastle-on-Tyne Permanent Building Society, securing £2240 and any other moneys, etc., and £740 and any other moneys, etc.; respectively charged on land with house thereon known as Borriskill, Dearham (Cumberland), and on 1 Ashby Street, Netherton. *Nil. April 17, 1948.

LACRINOID PRODUCTS, LTD., London, E.C. (M., 18/12/48.) November 9, mortgage and charge, to National Provincial Bank, Ltd., securing all moneys due to or to become due to the Bank; charged on premises at Eastern Avenue, Hornchurch, and at Strafford Avenue, Ardleigh Green, Hornchurch, with machinery, plant, etc., and general charge. *Nil. May 24, 1948.

SYNTILLA MANUFACTURING CO., LTD., Dunstable. (M., 18/12/48.) November 12, £400 debentures; general charge.

Satisfactions

BRITISH TYRE & RUBBER CO., LTD. (formerly **BRITISH GOODRICH RUBBER CO., LTD.**), London, S.W. (M.S., 18/12/48.) Satisfaction November 8, of Trust Deed registered May 10, 1933.

ELECTRONIC PRODUCTS (GLOS.), LTD., Gloucester. (M.S., 18/12/48.) Satisfaction November 8, of mortgage registered June 8, 1948.

POWER-GAS CORPORATION, LTD., Stockton-on-Tees. (M.S., 18/12/48.) Satisfaction November 10, of mortgage registered September 28, 1946.

PREMIER PLASTIC CO., LTD., Blackburn. (M.S., 18/12/48.) Satisfaction November 9, £1,000, registered October 3, 1947.

Company News

The following increases in registered capital are announced: **Barrywald Products, Ltd.**, from £12,500 to £25,000; **James Hardcastle (Specialities), Ltd.**, from £2000 to £5000; **P. T. Harris, Ltd.**, from £25,000 to £35,000; **New Cross Chemical Co., Ltd.**,

from £3000 to £10,000; **Pal Chemicals, Ltd.**, from £1000 to £44,000; **Petroleum Development (Qatar), Ltd.**, from £7,240,100 to £7,940,100; **Syria Petroleum Co., Ltd.**, from £3,900,100 to £4,100,100; **C. Winther & Co., Ltd.**, from £2500 to £10,000.

Lautaro Nitrate Company reports that operations covering the year ended June 30, 1948, resulted in distributable net profits of £961,243, as compared with £797,771 in the preceding 12 months.

The Distillers Co., Ltd., has declared an interim dividend on the ordinary stock for the year ending March 31, 1949, of 3 3/5d. per unit of 4s., less tax, payable on February 23.

The Weardale Lead Co., Ltd.—Profit for the year was £8726 11s. 9d. and the directors recommend payment of a dividend of 10 per cent.

New Companies Registered

Glostick, Ltd. (461,993).—Private company. Capital £100. Manufacturers of glues, chemicals and drugs, etc. Reg. office: 17 Conduit Street, W.1.

Peter Pan Associated Research, Ltd. (26,690). Private company. Capital £50,000. Chemists, research workers, etc. Reg. office: 30 Albyn Place, Aberdeen.

Chemical and Allied Stocks and Shares

ALTHOUGH holiday influences kept business at modest levels, stock markets have been firm following the commencement of the new Stock Exchange account. British Funds strengthened, helped by reinvestment of the £21 million "pay-out" made this week to old stockholders of the Argentine railways. Industrial shares showed small irregular movements, but attracted buyers on any reaction, and generally the chemical and kindred sections have been steady. Imperial Chemical eased to 48s. 6d.

Turner & Newall were 79s. 9d., and Monsanto Chemicals steady at 62s. 6d. Fisons changed hands at close on 59s., while Laporte 5s. units at 21s. 6d. were virtually the same as a week ago. Amber Chemical 2s. shares have been well maintained at 9s. 6d., and Albright & Wilson were 31s., while following the commencement of dealings in the shares, **Bowmans Chemicals** 4s. shares have been firm at 7s. 6d.

Burt, Boulton & Haywood remained at 28s. 9d., W. J. Bush were 82s. 6d., and Lawes Chemical 13s. 9d., and William Blythe 3s. shares have been dealt in at over

20s. In other directions, Blythe Colour 4s. shares changed hands at 60s., and British Glues 4s. units showed firmness at the higher level of 21s. 6d. The 4s. ordinary units of the Distillers Co. receded slightly to 29s. 1½d. on the unchanged interim dividend, there having been hopes in some quarters that the interim might have been brought more into relation to the final payment.

United Molasses at 51s. were firm on the assumption that profits are probably remaining on the up-grade owing to good earnings of the tanker section of the business. British Plaster Board were 23s. 3d., but elsewhere, British Aluminium (50s. 3d.) were easier inclined, and British Oxygen came back to 99s. 4½d. On the other hand, Dunlop Rubber moved up to 75s. 3d. Shares of companies connected with plastics were generally well maintained, British Xylonite being nearly £5½, British Industrial Plastics 2s. ordinary 6s. 10½d., while Erinoid 5s. shares changed hands up to 10s.

Iron and steel shares lost a few pence where changed, the market awaiting any further news as to the non-steel assets of the various companies which are to escape nationalisation. Dorman Long were 32s. 6d., Colvilles 37s. 3d., Guest Keen 47s. 9d., Stewarts & Lloyds 56s., and Thomas & Baldwins 15s. 1½d. In other directions, Babcock & Wilcox came back to 71s. 6d. Tube Investments were £6½, while news that the company has received further contracts from the Steel Company of Wales, strengthened Davy & United Engineering to 32s. 9d.

Lever & Unilever at 51s. 7½d. were inclined to attract buyers. Triplex Glass (23s. 6d.) kept steady on current trading reports; but as in many other instances, buyers failed to be attracted because it is realised that higher profits cannot be reflected in improved dividends. Nevertheless, the view appears to be growing in the City that the next Budget is likely to bring abolition of, or important modifications to, Sir Stafford Cripps's dividend limitation request. With controls being relaxed and further de-control measures likely in order to stimulate production, it is realised that competition is likely to develop considerably next year.

This means the prospect of lower earnings for less efficient concerns. In the circumstances, it is argued it is only fair that shareholders in efficient and enterprising companies should be allowed higher dividends when justified by earnings.

Boots Drug were 55s. 3d., Sangers 34s. 3d., but Beechams deferred eased to 17s. 6d. Aspro rallied to 28s. following the annual meeting. Oil shares reacted moderately in

the absence of demand, latest news of the big oil refining plants failing to influence the market.

British Chemical Prices

Market Reports

THE overall movement in industrial chemicals continues to be of substantial dimensions, with a fair weight of buying for overseas destinations. Delivery specifications have again covered good volumes and new buying orders, as well as contract replacement business, have been on a rather larger scale than is expected at this period of the year. No important price alterations have been notified other than the recent advance in the price of zinc oxide as a result of the dearer metal. The market does not display any feature on the week and the call for the soda compounds is steady, with supplies of caustic, chlorate and bichromate of soda none too plentiful, relative to the demand. This might also be said of formaldehyde, acetic acid and the potash chemicals generally. There has been no change in the market for the coal-tar products and a steady trade is reported. Pitch is again in good demand for home and export account.

MANCHESTER.—Firm price conditions are reported in almost all sections of the Manchester chemical market, though very little in the way of actual movement, one way or the other, has occurred. There is a steady home and export demand for the soda chemicals and all descriptions of the potash compounds are being taken up to the full extent of the quantities on offer. A steady inquiry for most of the ammonia and magnesia products from home consumers has also been reported. Many other chemicals, including bleaching powder, formaldehyde, alum and sulphate of alumina, are meeting with a good demand. A steady absorption of supplies of the leading tar products continues to be experienced.

GLASGOW.—The volume of business transacted in the Scottish chemical market has been slightly reduced during the past week, a circumstance not unusual at this time of the year, when there is always a period of a few weeks when the amount of actual business transacted is below average. There have been no changes in price, but a number of changes are expected to be announced in the New Year, and it is expected that in most cases these will be increases. Conditions in the export market have been more satisfactory. A number of orders have been obtained for delivery in the New Year, and a more healthy sign has been noted recently in that trial shipments of a number of materials have been despatched.

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.O.2, at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Production of polystyrene compositions.—Anglo-Iranian Oil Co., Ltd., E. W. M. Fawcett, A. Millien, and N. Mulhern. Jan. 2, 1943. 611,010.

Manufacture of esters of aminotriazine-formaldehyde condensation products.—Soc. of Chemical Industry in Basle. Feb. 5, 1942. 611,012.

Manufacture of highly etherified aminotriazine-formaldehyde condensation products.—Soc. of Chemical Industry in Basle. Feb. 5, 1942. 611,013.

Method of disintegrating and removing metal.—Elox Corporation. Oct. 2, 1943. 610,709.

Production of magnesium-oxide-containing mixtures.—Magnesium Metal Corporation, Ltd. (Permanent Metals Corporation.) Oct. 24, 1944. 610,806.

Anthraquinone acid dyestuffs.—Allied Chemical & Dye Corporation. Jan. 1, 1944. 610,808.

Reclaiming Rubber.—U.S. Rubber Reclaiming Co., Inc. Feb. 26, 1944. 610,812.

Recovery of monoesters of polyhydric alcohols with fatty acids and of volatile non-saponifiable matter from fatty oils and waxes.—Lankro Chemicals, Ltd., and E. M. Meade. Feb. 27, 1945. 610,710.

Plastic product and method of forming same.—Z. T. Walter. March 12, 1945. 611,038.

Oils for industrial purposes and manufacture thereof.—Les Usines de Melle. March 10, 1942. 611,040.

Process of converting lignin predominantly into its aldehydic and acidic fractions.—Institute of Paper Chemistry. May 17, 1944. 610,714. Process of recovering vanillic acid from lignin.—May 17, 1944. 610,814.

Flotation separation of magnesium and calcium carbonates.—Basic Refractories, Inc., and J. C. Arnold. June 14, 1945. 610,817.

Alkaline dry cell.—P. R. Mallory & Co., Inc., and W. W. Triggs. Oct. 8, 1945. 610,719.

Process for the separation and purification of stereoisomeric hydrophenanthrene carboxylic acids.—Ciba, Ltd. July 6, 1945. 610,723.

Stabilising of foam.—Wernald Bros., Pty., Ltd. Nov. 22, 1944. 610,822.

Method and composition for degreasing and forming an oxide film on metals.—Solvents Research Co., Ltd., and N. Drey. Nov. 30, 1945. 610,724.

Method of preparing compounds of high pharmacological and therapeutic properties.—R. Adams. June 19, 1945. 610,835.

Synthetic rubber compositions and method of preparing same.—B. F. Goodrich Co. Jan. 20, 1945. 610,728.

Apparatus for feeding and shaping plastic material.—B. Duijts. Jan. 23, 1946. 610,842.

Process for the production of alkyl halides.—N.V. Chemische Fabriek Naarden. May 5, 1941. 610,843.

Process for the manufacture of 2:5 dimethylfuran and acetonylactone.—I. M. Heilbron, and E. R. H. Jones. Jan. 28, 1946. 611,072.

Purification of penicillin salts.—Glaxo Laboratories, Ltd., E. L. Smith, and A. E. Bide. Feb. 11, 1946. 610,731.

Manufacture of fibres from thermoplastic materials such as glass.—Soc. Anon. Des Manufactures Des Glaces et Produits Chimiques de St. Gobain, Chauny & Cirey. Feb. 12, 1945. 610,845.

Refining of steel.—E. F. J. Warnant. Feb. 14, 1945. 610,846.

Process for plasticising natural or synthetic rubber.—Mo och Domsjo A/B. Dec. 28, 1943. 611,077.

Production of alkali cellulose.—Mo och Domsjo A/B. March 9, 1945. 611,081.

Manufacture of gelatine blasting explosives.—I.C.I., Ltd., and S. Fordham. March 14, 1946. 610,850.

Alumina low silica refractory.—Corning Glass Works. April 10, 1945. 610,854.

Recovery of zinc from zinciferous material containing iron and apparatus suitable therefor.—Revere Copper & Brass, Inc. Sept. 6, 1945. 610,856.

Process for the degradation of steroid compounds.—Ciba, Ltd. April 13, 1945. 611,089.

Process for the preparation of dihydrophenanthridine compounds.—Wellcome Foundation, Ltd., F. C. Copp, and L. P. Walls. April 9, 1946. 610,915.

Manufacture of allyl alcohol.—British Celanese, Ltd. April 12, 1945. 610,613.

Rotary welding electrodes.—A. V. Roe & Co., Ltd., and R. F. Taylor. April 11, 1946. 610,617.

Process for the separation of isomeric substituted quinoline carboxylic acids and esters thereof.—Soc. des Usines Chimiques Rhone-Poulenc. May 17, 1945. 610,679.

Solid boundary surfaces for fluid streams.—J. H. Preston, and B. Thwaites. April 11, 1946. 610,622.

Control of fluid flow along a solid boundary surface.—S. Goldstein, E. J. Richards, and J. H. Preston. April 11, 1946. 610,623.

Apparatus for forcing water by gaseous pressure.—A. J. Fermor, and T. E. Hardacre. April 11, 1946. 610,625.

Manufacture of bituminous materials.—Limmer & Trinidad Lake Asphalt Co., Ltd., and D. C. Broome. April 11, 1946. 610,629.

Manufacture of phenolic resins for casting.—Erinoid, Ltd., C. A. Redfarn, and A. M. Bremner. April 11, 1946. 610,937.

Apparatus for drying crystalline or granular materials.—G. Royston. April 12, 1946. 610,631.

Colloidal silver and light-filter layers thereof.—E. I. Du Pont de Nemours & Co. April 26, 1945. 610,941.

Recovery of penicillin.—Distillers Co., Ltd., and J. J. H. Hastings. April 12, 1946. 610,649.

Sintering apparatus.—L. Gelbman. April 12, 1946. 610,660.

Combined brazing and welding process for uniting metals.—Brown, Moverie & Co. A.G. Jan. 4, 1946. 610,949.

Manufacture of carbonaceous moulding powders and of moulding products.—C.D. Patents, Ltd., J. G. Bennett, C. D. Greaves, E. C. O. Bethune, and W. D. Parker. April 15, 1946. 610,749.

Process for the production of carboxylic acid amides and imides.—General Aniline & Film Corporation. April 12, 1945. 610,952.

Nitriding process.—Nitalloy Corporation. April 28, 1945. 610,953.

Process for the production of ketones and aldehydes.—J. C. Arnold (Standard Oil Development Co.). April 15, 1946. 610,752.

Means for controlling the supply of powdered, granulated or pulverised material from a hopper or chamber, into a chamber or the like beneath it.—Laing, Son & Co. (M/C.), Ltd., and A. L. Okell. April 16, 1946. 610,761.

Process for the preparation of metallisable polyazo-dyestuffs.—Sandoz, Ltd. April 16, 1945. 610,772.

Process for the production of chromable azo-dyestuffs.—J. R. Geigy A.G. April 17, 1945. 610,857.

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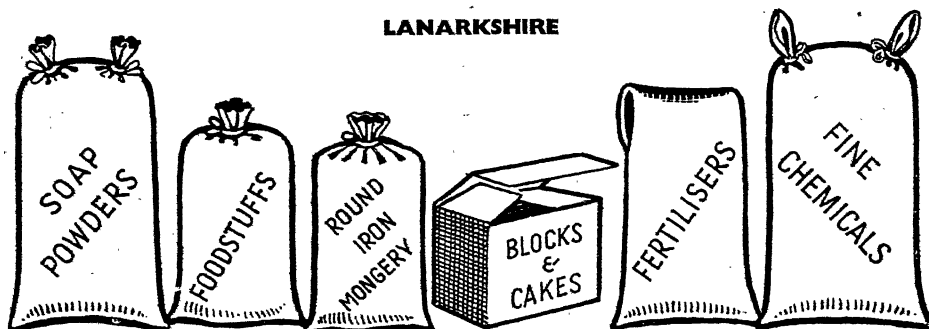
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A Cautionary Tale

WHAT are the Government's objectives when it seeks information concerning policy and prospects and proposes a more intimate relationship between itself and a particular industry? There are many answers to that question, of which the conventional one—to promote the wellbeing and enhance the productivity of the industry by official aid—does not square with all the facts. The Board of Trade's request that the Association of British Chemical Manufacturers shall provide it with an overall survey of present conditions and future prospects has now brought that question very prominently to mind, while from another quarter—the British Iron and Steel Federation—has come a document reviewing what has been the reward of the steel industry's close collaboration with the Government in the past, and what are likely to be the results of the Government's decision to adopt the rôle of the wolf in the tale of the Three Little Pigs. It presents in relation to the situation, if the Iron and Steel Bill is enacted, a picture of arbitrary division and confusion of functions capable of rendering a great industry almost impotent in a few years.

It first shows most convincingly, with tabulated statistics, how very far from the business of iron and steel making the Government corporation is proposing to

wander if it acquires control of 107 firms and 250 subsidiaries named in the Bill. Taking four typical examples from the firms to be nationalised, the Iron and Steel Federation shows how relatively few of those they employ are concerned with the basic production of iron ore, pig-iron, ingots and hot rolled material (Bayliss, Jones & Bayliss, Ltd., 8.4 per cent; Wm. Beardmore & Co., Ltd., 14.2; Richard Johnson & Nephew, 7.1; the Carron Company 4.4).

The whole document reveals how flimsy is the original Government argument that action was imperative by the need for national control of the basic business of iron and steel production and, of even more topical interest, it shows what is now seen to have been a corollary of the establishment of Development Councils.

"An essential function envisaged for development councils," says the Iron and Steel Federation, "is the provision of common services covering research, statistics, development, etc., very much on the lines of those provided by the federation. But if the view now gains currency the industries whose activities are so co-ordinated and serviced are regarded by the Government as being 'ripe for nationalisation' this will clearly render the development council concept abortive and will also prejudice other forms of organisation on an industrial basis, however construc-

On Other Pages

Leader :			
<i>A Cautionary Tale</i>	837	<i>Soviet Chemical Policy</i>	845
Notes and Comments :		<i>Revised British Standards</i>	846
<i>Pictorial Technology</i>	839	<i>Preventing Glass Decay</i>	846
<i>Universities' Independence</i>	839	<i>Hard-facing Electrodes</i>	846
<i>Freedom to Advertise</i>	839	<i>Indian Steel Scarcity</i>	846
<i>News Value</i>	840	<i>Chemical Fertilisers</i>	847
<i>BR Research</i>	840	<i>Alleged Noxious Emission</i>	847
<i>The 1949 Year Book</i>	840	<i>I.C.I.'s New Copper Plant</i>	847
<i>Brotherton's Reorganisation</i>	841	<i>Vinyl Chloride from Dichloroethane</i>	848
<i>Trading Controls Revoked</i>	841	<i>New French Procedure for Sulphuric Anhydride</i>	848
<i>Transport Lighting Regulations</i>	841	<i>Sulphuric Acid Patents</i>	849
<i>Purchase Tax Exemptions</i>	842	<i>Economic Acid Recovery</i>	850
<i>Token Imports Continued</i>	842	<i>Electrolytic Saccharin</i>	851
<i>Poland's Chemicals and Metals</i>	842	<i>Potentialities of Powdered Rubber</i>	852
<i>£800 M. for Chemical Industry</i>	843	<i>Pozzolana Cements</i>	853
<i>Alleged Rubber Cartel</i>	843	<i>Pakistan's Chemical Projects</i>	855
<i>France's First Atomic Pile</i>	843	<i>Technical Supplies and Services</i>	857
<i>Synthetic Petroleum Project</i>	843	<i>Widening Scope of Nylon and Rayon</i>	858
<i>Industry in the German Bizone</i>	844	<i>Australian Distinction</i>	860
<i>DFDT: Patent German Compound Tested</i>	844	<i>Coconut Products</i>	860
		<i>Prices of British Chemical Products</i>	864

tive and valuable their services may be. Indeed, the whole theme of the Government case on steel, namely, that industrial organisation, even when controlled by a public body such as the Iron and Steel Board, is not 'safe' and that control must be combined with ownership to be satisfactory proves far too much. It certainly cuts at the very basis of broad industrial planning by the Government and destroys any confidence there may have been that there can be a satisfactory basis of co-operation between Government and industry."

The foregoing represents the well considered views of those who have long been responsible for the fortunes of the steel industry; their reconstruction of the course of events associated with the presentation of the Iron and Steel Bill is clearly worthy of being studied, perhaps especially at the moment by the spokesmen of the chemical industries.

That, it is worth noting, is also the belief expressed in a recent leading article in *The Financial Times* (December 18), which, although based largely on speculation, calls attention to a number of portents of which responsible opinion in chemical industry cannot be unaware.

"Memories need not be long," *The Financial Times* observes, "to recall a pamphlet entitled 'Public Ownership—

the Next Step,' which was circulated to local branches of the Labour Party last March. This dealt with the possible nationalisation policy of the Party at the next General Election. It suggested that the Party should select its victims from among industries which were one—and particularly those which were more than one—of the following:—

"(1) Basic industries such as steel and chemicals. (2) Monopolised by a trust or trusts. (3) Inefficient because they were unable to find finance for development, or split into units too small for economic co-operation. (4) Investors of capital on a large scale. (5) Suffering from bad industrial relations."

The article wisely absolves chemical industries from the criticisms implicit in clauses 3 and 5 of the Labour Party's blueprint, but notes that in a broadside discharge such as this some shots will find targets. "It can hardly be questioned," it says, "that the chemical industry in many ways answers to the Labour Party's description of the ideal patient on which to conduct experiments in nationalisation. . . . Suspicion of (the Government's) intentions must continue, even after the Government has come into possession of the comprehensive survey it has requested of the industry's plans and probable lines of development."

NOTES AND COMMENTS

Pictorial Technology

ONE of the most promising approaches to the heavily canvassed problem of providing the right kind of technical education in industry—especially in applied chemical industry—is being offered by the film meetings of the Institute of Chemical Engineers. These are only one aspect of an enterprising programme of works visits, debates and similar practical introductions to the hard facts of chemical production and economics which the institute is offering. An excellent topical example was their presentation a few days ago of a cinematograph review of the increasingly important oil refining industry, dealing with octane number and cracking. Development of engines of increasingly high compression ratios and the generally increasing demand for petrol have combined to spur on work on cracking of the heavy fractions from petroleum. Structures of the cracked molecular fragments were shown to be similar to those of "natural" (straight distilled) petrols of good anti-knock properties. Few among that audience may have gained much solid technical information, but the purposes of such films are rather wider than that. Such enterprising policy calls for a specialised technique and particularly for safeguards against ambiguity of any kind, since photographic portrayal admits no "questions and answers." One stage in the film presentation of oil cracking processes shows molecular models fading into vague elongated bacillus-like shapes. In the absence of explanation these essays in surrealism are dangerous food for beginners, who might be tempted to see these abstract forms as the physical representation of molecules. The subject is sufficiently complicated without exchanging identities.

Universities' Independence

REASSURING view of a subject about which it is evident there is a good deal of apprehension is taken by Sir Richard Livingstone, President of Corpus Christi College, Oxford. His confidence that universities need not anticipate they will be "much troubled by State interference," notwithstanding the greatly

widened Government interest, financial and otherwise, in their affairs, may be envied by some who take a less buoyant view of possible results of the very much closer relationship being built up here and in related spheres, especially in the realm of science. Such a warning seemed to have been implicit in Sir Robert Robinson's recent advice to Royal Society members to consider well the possible outcome of more intimate integration of science and the State—any State. The Archbishop of York, presiding at the dinner of the York and District Branch of the Oxford Society, at which Sir Richard Livingstone voiced his belief that public opinion would ensure that universities would be left to do their business by themselves, clearly has discerned a similar cloud on the horizon. He foresaw that the enlarged grants now being made by the Government to the Universities, welcome as they were, might have an affinity with the Trojan horse. "Some of us feel just a shade of anxiety," he said, "lest the grants should in any way interfere with the freedom of the universities." That manifestly was not an overstatement of the feeling widely held, which the policy of the Lord President of the Council (Mr. Herbert Morrison) as revealed so far has not allayed.

Freedom to Advertise

SEVERAL circumstances have combined in the past few days to promote a more realistic and balanced outlook on the subject of advertising, which Government policy of late seems to have conspired to place under a cloud. It is certainly not a gross exaggeration to say that the impression has been fostered that to use Press advertising on a normal scale was, however, slightly improper, even perhaps not quite patriotic. Government "pep talks" on the hoardings were quite another matter. Now, after full experiment with "controlled" advertising expenditures, even the Government, it appears, has recognised that the only competent authority to decide when to advertise, and to what extent is the advertiser himself. On and after March 7 next year the advertiser will accordingly be permitted to resume his familiar responsibility of deciding how much it would be

profitable for his undertaking to spend on advertising, without official limitations. The principle of voluntary limitation will remain, although immoderation in advertising is not a contemporary failing and there are ample safeguards, notably paper shortage, to ensure that it does not become so. The simultaneous appointment by the International Chamber of Commerce of a council to ensure that its Code of Standards of Advertising Practice is effective may be taken as further evidence that the commercial community is competent to regulate its own affairs.

News Value

THE foregoing is the broad view, of which there are specialised aspects equally worth considering, such as the point of view expressed by Mr. Geoffrey A. Shires, one of the Dunlop Rubber Company's research people at Fort Dunlop. He reminded the Association of Special Libraries and Information Bureaux, meeting in London, that anything up to 80 per cent of a technical journal to-day consisted of advertisements and those advertising pages were a legitimate quarrying ground for an information service. Details of plant or apparatus, he pointed out, might be as important as a piece of scientific investigation: with some products, where fashion or stock changed fairly often, advertisements became one of the few instances where technical information really justified "hot" service.

BR Research

THE importance of the contribution to the widening of scientific knowledge made by the chemical and physical laboratories of the railway companies is perhaps not fully appreciated. From Glasgow in the north to Ashford in the south, railway chemists must be prepared to cope with the 101 problems that arise out of the diversity of the railways' services to the public and industry. In an admirable lecture at the Northern Polytechnic, in London recently, Mr. W. P. Henderson, chief chemist, London Midland Region of British Railways, emphasised this importance. It seems all the more regrettable therefore, that, while the decision to bring all the railway systems under unified control was taken long ago, nothing seems to have been settled about the future of their chemical research—or if it has those on

whom that work depends have not been told. Replying to a CHEMICAL AGE representative, Mr. Henderson said he did not know whether there would be further centralisation, though he believed it was under consideration. His own opinion, which many will share, was that it was not satisfactory to centralise to the fullest extent, and that, with the variety of research involved, it was more appropriate to deal in areas. Here is the considered verdict of an expert, and as such it might well be borne in mind by the authorities.

The 1949 Year Book

ATTIRED once again in the red covers with which subscribers were familiar in the past, THE CHEMICAL AGE YEAR BOOK, 1949, is now being despatched to representatives of chemical and related industries throughout the country and overseas. It is hoped that most of the copies of this basic work of reference to chemical industries and authorities, supplies, statistics, bibliography and commercial affairs will have reached subscribers at an appropriate season, when the eve of Christmas and the imminence of another year make most acceptable the arrival of an object of use throughout the succeeding 12 months. While the revised text of the 1949 Year Book covers 21 separate aspects of chemical affairs, the value as a whole of a publication such as this derives a great deal from the Buyers' Guide, extending this year to 42 pp. of classified information about supplies and suppliers, the need for which is constantly evidenced by the frequency with which requests for such information are received by THE CHEMICAL AGE. The wide changes in scope and direction of industries during and since the war and the arrival of a number of new materials and new requirements render a liaison service of this kind indispensable, and the very full complement of advertising pages, this year making liberal use of decorative colour effects, helps to make this a comprehensive and detailed guide. There remains, however, one stubborn supply problem to which the Year Book itself has no answer—that of paper supplies, the insufficiency of which is the reason why the distribution of copies in the United Kingdom is limited to subscribers to THE CHEMICAL AGE.

Trading Controls Revoked

Dyestuffs and Potash Chemicals

THE removal of trading controls imposed by the Government on two important categories of chemical materials has been announced by the Board of Trade, implementing the proposed relaxations mentioned by the President of the Board of Trade last month.

The first relates to the Control of Dyestuffs orders which prohibit the sale and supply of dyestuffs and intermediates except under licence by the Board of Trade. These orders are: S.R. & O. 1939 (No. 1431); S.R. & O. 1940 (No. 1836); S.R. & O. 1941 (No. 171).

The new revocation order, Raw Materials (Various Controls) (Revocation) (No. 2) Order, 1948, does not affect the regulations governing the import and export of dyestuffs and intermediates, for which licences are still required. It will come into operation on January 1, 1949.

Potash

Two Government orders which prohibit the acquisition, disposal and use of caustic potash and carbonate of potash except under licence granted by the Board of Trade are also being revoked. The orders are S.R. & O. 1941 (No. 55) and S.R. and O. 1941 (No. 931).

After the revocation order comes into operation on January 1, 1949, consumers' licences will no longer be required. All other arrangements governing imports, exports, methods of distribution and prices will continue as before.

[Note.—These are two of the relaxations of controls, already announced by the President of the Board of Trade on November 4. The Revocation Order gives Statutory effect to these relaxations.]

Transport Lighting Regulations

The Traders' Road Transport Association, the national organisation for C. licence operators, points out through its "Monthly Bulletin" that after January 1, 1949, passlamps and other permanently-dipped headlights must be fitted so that the centre is at least 2 ft. from the ground. After that date passlamps less than 2 ft. from the ground may be used only in fog or when snow is falling. All passlamps—and similar lamps—should point downwards so that they are incapable of dazzling any person more than 25 ft. away whose eye level is not less than 3½ ft. from the ground. There are several other anti-dazzle requirements affecting ordinary headlamps and sidelights.

Brotherton's Reorganisation

Large Re-Allocation of Capital Proposed

THE 70-years-old firm of chemical manufacturers, Brotherton & Co., Ltd., Leeds, which is among the largest individual firms of its kind, is to be divided into a public company of the same name to take over the chemical undertaking with a capital of £1,275,000, and a private investment trust, to be controlled by the Brotherton family, with a capital of £1,475,000. This is the effect of proposals published last week.

Public Shares

The Capital Issues Committee has already given its consent to the scheme, and if the High Court's sanction to the reorganisation is obtained, it is intended to make application to the London Stock Exchange for permission to deal in the ordinary shares of the public company.

The new companies will be entirely independent of each other, and their total capital will be equal to the issued capital of the present company. In the new public company of Brotherton & Co., Ltd., it is proposed to issue 250,000, 6 per cent cumulative preference shares of £1 each, and 2,050,000 ordinary shares of 10s. each. The private investment trust is to consist of 450,000 4 per cent preference shares of £1 each, and 2,050,000 ordinary shares of 10s. each.

For each £1 of stock of the present company now held, stockholders will receive: 6 per cent preference—one 6 per cent share of £1 in the new Brotherton & Co., Ltd.; 4 per cent preference—one 4 per cent preference share of £1 in the new investment trust; ordinary stock—one ordinary share of 10s. in each of the two new companies.

Family Concern

The building up of the great organisation of Brotherton & Co., Ltd., is a notable example of the success of a family concern, and the passing of its personal element will be regretted. The new status, however, will no doubt afford more flexible conditions for full capitalisation to cope with the currently largely increased costs of plant replacements in a progressive business.

The business was founded on September 1, 1878, when the late Mr. Edward Brotherton—afterwards Lord Brotherton—at the age of 22 established works at Wakefield for the manufacture of sulphate of ammonia.

There followed the opening of a small works at Leeds, and later plants at Birmingham, Stourton (Leeds), Glasgow, Sunderland, Litherland (Liverpool) and Workington. Mr. Charles Brotherton is the present chairman.

Purchase Tax Exemptions

Additions to the Drugs and Medicines Schedules

THE Treasury has made under Sections 21 and 22 of the Finance Act, 1948, the Purchase Tax (No. 5) Order, 1948, which re-enacts, with additions, the list of essential drugs and medicines (not proprietary preparations) which are exempt from Purchase Tax.

All drugs previously exempt under the revoked Purchase Tax No. 1 Order remain exempt and any entries in the old list of exempt drugs and medicines which no longer appear in the schedule to the new order have been assimilated into more comprehensive entries.

The order applies to goods which are delivered or appropriated for retail sale by a registered manufacturer or wholesaler on or after December 15, or which are entered with the Customs or delivered from bonded warehouse by the same date.

The new additions to the schedule of drugs exempt from purchase tax are these:—

HEAD I

Acetarsol, salts and preparations containing not less than *six* per cent by weight of acetarsol.

HEAD II

Acetylcholine, acetyl-beta-methylcholine, and salts thereof; aluminium hydroxide; ascaridole; 4-cyclohexyl-3-ethyl-1:2:4-triazole; dehydrocholic acid and its sodium salt; di-(2-chloroethyl)methylamine and tri-(2-chloroethyl)amine, and salts thereof; n-diethylaminoethyl-thiophenylamine, and salts thereof; 1-diethylcarbamyl-4-methyl-piperazine, and salts thereof; 5:7 di-iodo-8-hydroxyquinoline; di-isopropylfluorophosphate; 2:8-dimercaptopropanol; Russell's viper venom, prepared for use as a haemostatic; stilbamidine and other diamidines of diphenyl or diphenoxyl derivatives of aliphatic hydrocarbons whether substituted or not, and salts thereof; tetraethylammonium halides; tetraethylpyrophosphate; tetraethylthiuram monosulphide, and preparations containing not less than 25 per cent of tetraethylthiuram monosulphide; triphenylchloroethylene; yellow bone marrow concentrate.

HEAD III

Suspensions with pectin and kaolin of *p*-aminobenzenesulphonamide, salts of *p*-aminobenzenesulphonamide, derivatives of *p*-aminobenzenesulphonamide having any of the hydrogen atoms of the *p*-amino group or of the sulphonamide group substituted by another radical.

Benzyl oxyethyl dimethylethylammonium salts: benzyl benzoate, and preparations containing not less than 10 per cent of benzyl benzoate; chloroform (anaesthetic); serum gonadotrophin; 4:4-diphenyl-6-morpholinohexane-3-one, and salts thereof; ether (anaesthetic); preparations of the following glands: parathyroid, thyroid, pituitary, suprarenal, ovary, testis, spleen, corpus luteum, prostate, pancreas; glycosides of digitalis; homatropine, and salts thereof; hyoscamine, and salts thereof; lobeline, and salts thereof; organo-mercury compounds; pilocarpine, and salts thereof; physostigmine, and salts thereof; sodium *p*-glycolyl arsenate; sodium propionate, with or without terpineol; sparteine, and salts thereof; trichloroethylene,

whether with or without a stabiliser or a colouring agent; vinyl ether; the anti-microbial substances, or salts thereof, produced by the growth of *Bacillus polymyxa* on a suitable medium.

The following substances, and their salts and derivatives:—Anti-histamine substances, being tetra substituted N derivatives of ethylene diamine; beta-dimethylaminoethyl-benzhydryl-ether; 2-phenyl-benzyl aminomethylimidazoline; alpha-(3:4-dihydroxyphenyl)-beta-isopropylamine ethanol; 3'-di-(n-butyl)amino-methyl-4:5:6-trihydroxy-benzo-(1:2-c)-furan-1'(3')-one; n-dimethylaminoethyl-n-p-methoxy-benzyl-alpha-amino-pyridine; n-(beta-dimethylamino-beta-methyl-ethyl)-thiophenylamine.

The glucoside formed by the combination of 5:7:8:4'-tetrahydroxyflavonol with glucose and rhamnose.

HEAD V

Therapeutic substances intended to be used solely for veterinary purposes, if prepared for use by injection or by application to the scarified skin.

(Sera and antitoxins):—Anti-black-disease serum; anti-canine-distemper serum; anti-haemorrhage-septicaemia serum; Clostridium pyogenes serum; mixed or polyvalent sera whose components are exempt from tax; pregnant mares' serum.

(Vaccines):—Black disease vaccine; contagious pustular dermatitis (Orf) vaccine; haemorrhage-septicaemia vaccine; leptospira vaccine; canine distemper prophylactics—Method I vaccine and virus, Method II virus and serum.

TOKEN IMPORTS CONTINUED

THE Board of Trade announces that the Token Import Scheme in 1949 will continue on the same basis as 1948. The annual quota will remain 20 per cent by value of each individual manufacturers' average trade in 1936/38 with the United Kingdom in the commodity concerned. Participating countries are: Australia, Belgium and Luxembourg, Canada, Denmark, Finland, France, Holland, India, Italy, Norway, Pakistan, Sweden, Switzerland and U.S.A.

Chemical materials embraced by the scheme include: Paints and varnishes, bone black, porcelain enamel frit, proprietary medicinal preparations, petroleum jelly, preparations, non-liquid shampoos (not more than 1 oz containers), laundry soap, sporting cartridges (loaded and empty), sporting powder, fuses and detonators.

Poland's Chemicals and Metals

Referring to the item in THE CHEMICAL AGE, September 25, "Poland's Chemicals and Metal Trading Groups," C.I.E.C.H. (Centrala Importowo-Exportowa Chemicznej i Aparatury Chemicznej) Ul. Jasna 10, Warsaw, has asked us to state that the Polish export of zinc white, red lead and gleit (litharge) is carried on by them and not by the Combine of the Non-Ferrous Metal Industry, Katowice.

£800 M. for Chemicals

Government's Four-Year Programme

THE provision for capital expansions of the United Kingdom's chemical industry at the rate of £200 million a year for the next four years is contemplated in the Government's economic programme, which was submitted to the Organisation for European Economic Co-operation and has now been published as a White Paper (Cmd. 7372, HMSO, 1s. 3d.)

Replacing Imports

The official forecast anticipates that by 1952 some £800 million will have been spent on chemical expansion in this country, with the object chiefly of retaining here the £60-70 million spent annually on chemical imports; and, as a secondary objective, to raise chemical exports to some 90 per cent above the 1938 level.

Iron and steel production, according to the Government view, will provide 17,020,000 metric tons of crude steel annually by 1952 (11,437,000 metric tons average in 1935-38).

In assessing the comparative value of the £800 million estimated to be required by the chemical industry, it is of interest that Imperial Chemical Industries' estimate of its own future expenditure, although not within the same period, is £130 million. For re-equipping the coal industry £600 million is expected to be required by 1952.

ALLEGED RUBBER CARTEL

THE U.S. Department of Justice has announced that it has filed a suit to break up an alleged world cartel in natural rubber products. The complaint named as defendants the Dunlop Rubber Co., Ltd., London, the Consolidated Rubber Manufacturers, Ltd., of New York City and London, and the United States Rubber Co., of New York City. The three firms are charged with conspiring with 13 foreign firms to divide the world's markets for the sale of rubber products.

It is alleged that the 16 firms formed a cartel, each agreeing not to sell or ship certain rubber products to a territory allotted to other members, and established a world-wide patent pool. As a result, it is alleged, competition among the defendants had been eliminated throughout the markets of the world, and exports and imports of the U.S.A. were restricted.

The complaint says that while the war and disturbed world conditions had caused some minor alterations in the working of the cartel, the basic arrangements had continued, state Reuter and B.U.P. reports.

France's First Atomic Pile

Experimental Operation Near Paris

THE French Atomic Energy Commission announced last week that the first French atomic pile had been set in operation. This small experimental construction is situated at the Fort de Chatillon, a fortress on the southern outskirts of Paris. The headquarters of the French Atomic Research Department there states that at the first test the pile of uranium and heavy water developed a strength of several watts. At full working strength its power was expected to reach several kW. The statement added that the pile was constructed principally as an experiment, to give experience to technicians and resolve problems in the construction of piles of greater strength. It would, however, produce artificial radioelements, employed in hospitals and laboratories.

SYNTHETIC PETROLEUM PROJECT

WITH the intention of constructing plants at different places near the coalfields of Bihar and Bengal for the synthetic production of petroleum and products the Government of India has asked the coal industry whether the additional quantity of about 10 to 12 million tons annually of inferior grade coal can be produced by the existing collieries within five years, the period by which the plan may be put into operation. The Government has indicated it may be willing to provide finance and equipment.

The industry is stated to have signified its willingness to provide this quantity of inferior grade coal from the existing units if the Government removes certain obstacles and assures the mines will not be nationalised within a reasonable period.

The location of the plants is likely to be near Dishergarh Telaiya and Sindri where coal and water required for their operation can be had in abundance.

Caustic Soda from Seawater

To help relieve the serious shortage of caustic soda in Japan, the Teikoku Rayon Company is conducting a programme of research for production by direct electrolysis of seawater, according to the U.S. Department of Commerce.

Eight small electrolyzers installed at the company's Iwakuri mill, Yamaguchi Prefecture, are reported to be producing about 15 kg. daily of 99.8 per cent pure caustic. The alkali is recovered at 15 to 20 per cent concentration; chlorine and bromine are obtained as co-products.

Industry in the German Bizone

Power Shortage Reduces Chemical Output

THE principal industrial problem in the bizonal area during the month of October was the increasing burden on already overtaxed facilities for generating electric power. Chemicals were the industry most adversely affected, but nevertheless production as a whole has been almost constant for three months since the rise which followed the currency reform.

Level Maintained

In the *Monthly Report of the Control Commission for Germany (British Element)*, Vol. 3, No. 10, October, 1948, the index for the chemical industry is given as 68 per cent of the 1936 level in August, 70 per cent in September, and 68 per cent in October. Basic chemicals varied only slightly from September the fall of 9500 in calcium carbide being due to drastic power cuts in Land Nordrhein-Westfalen and shortage of hydro-electric power in Land Bayern.

Caustic soda and chlorine production remained practically unchanged, but soda ash dropped slightly to 33,500 tons.

Commodities which showed a rise in output during the month under review were: sulphuric acid; primary nitrogen; phosphates (excluding ground phosphate rock); paint, varnish and lacquer; soap and washing powders.

Among the non-ferrous metals smelter production of copper, lead, and zinc rose during October. As was anticipated, aluminium output fell to 890 metric tons due to power shortage, and a further reduction in November seemed unavoidable.

Production of electrolytic copper, zinc (including zinc dust), and hard and soft lead all showed small but satisfactory increases.

The Nord-Deutsche Affinerie, Hamburg, most important bizonal producer of electrolytic copper, has negotiated a processing contract with Norway to refine 2600 tons of blister crude copper, 4000 tons of copper concentrates and 9000 tons of matte (an intermediate smelter product), with the proviso that all copper be returned to Norway. The contract will benefit the bizonal economy mainly because processing the sulphur-bearing Norwegian matte permits domestic matte, which is poor in sulphur to be processed.

Iron and steel production continued to increase and now stands at 51 per cent of the 1936 level. In the course of the past five months of rapidly rising crude steel production, there has been a tendency towards lack of balance between pig iron and ingot steel on the one hand, and finished steel products on the other. Both Allied and German authorities concerned with steel production are studying this problem.

Increased Output

October showed a rise in nearly all consumer goods. The principal items were: Glass and ceramics which reached 97 per cent of the 1936 level; sawmills and wood-working 74 per cent; stones and earths 89 per cent, and leather and leather products 67 per cent.

DFDT: U.S. Report on German Insecticide

AN insecticide used by the Germans during the war has recently been carefully studied in America, and Dr. W. T. Sumnerford, chemist in charge of the technical development division, Communicable Disease Centre of the United States Public Health Service at Savannah, Georgia, gave a report on it in his address to the fourth annual general south-west regional meeting of the American Chemical Society at Shreveport, Louisiana.

The compound, Di-fluoro-diphenyl-trichloroethane, which has become known as DFDT, is a low-melting white solid, with a slight odour resembling that of ripe apples.

DFDT does not, the doctor stated, possess the broad killing powers of DDT towards all insects, but has proved more potent against flying insects, particularly house flies. It can be prepared by con-

densing chloral and fluorobenzene in the presence of sulphuric acid or chlorosulphonic acid. Best results are obtained at a temperature around that of melting ice.

The more common chloral hydrate and commercially important chloral alcoholate can be substituted for chloral in the reaction, but the yields are not so good under the usual conditions for carrying out the condensation.

Purification of DFDT can be accomplished by the use of certain solvents, but quite good biological kills were obtained with the crude DFDT after it had been removed from the reaction flask and washed once with a weak alkali.

Like DDT, the new compound is extremely insoluble in water, but far more soluble in a variety of solvents including kerosene, xylene, edible fats and oils.

SOVIET CHEMICAL POLICY

Exploiting German Sources of Fuel and Fertilisers

RELIABLE information is scanty regarding the fate in recent months of those parts of Germany's great chemical capacity which have remained under U.S.S.R. control. A substantial part is known to have been transported to Soviet territory either piecemeal or in some instances as whole undertakings and there is no indication that the Russian policy of confiscating large proportions of output of all basic chemical products, as reparations or otherwise, has been relaxed.

Recent reports, however, indicate that the great Leuna works, near Merseburg, formerly the largest single unit of I. G. Farbenindustrie and now treated as Soviet property, is in a position to make a large contribution to the supplies of artificial fertilisers within the Soviet economy.

Although the works suffered devastation in the course of the war, the reconstruction since achieved is demonstrated by the fact that the works is now credited with employing as many as 23,000 persons. New workers' settlements have been established in the vicinity of the works to accommodate those rendered homeless through bombing and, by adoption of the principle of equal pay for equal work, some 4000 female workers are paid the same wages as men provided that they are engaged on "typically male work." Employment is given to some 500 invalids, and under a promotion scheme promising persons are given further education at Halle University.

Leuna Works Output

The Leuna works had been famous for the large-scale production of synthetic fuel according to the Bergius hydrogenation process taken up in 1927. No synthetic oil is, however, at present being produced because the acute shortage of fertilisers has necessitated a complete change in the manufacturing programme, although the production of nitrogenous fertilisers was no new departure. It started in 1917 employing the Haber-Bosch process. In 1939 the Leuna works was reported to have contributed one-third of the total German chemical fertiliser supply. Present output, important as it is to Eastern Germany, has by no means yet reached its former magnitude.

Russia can in fact dispense with the former synthetic fuel output at Leuna because it has at its disposal a number of hydrogenation works. There is, for instance, the Lützendorf plant near Merseburg, which now employs some 4500 workers, the Winterhall plant, with about

2000 workers, the Schwarzheide unit, 3800 workers, and the plant at Zeitz, which employs no less than 7000, and the Brabag (Braunkohle-Benzin A.G.) at Magdeburg, which is reported to have several thousand on its payroll.

Liquid Fuel Supply

Further hydrogenation plants are operating at Böhlen, Deuben, Köpsen and Rositz. Although most of these are said to be in full operation, the liquid fuel supply position of the Russian zone is deteriorating because the bulk of the output is being shipped to Russia. The needs of the occupation army are of course also being met from local output.

A report from the special correspondent of *The Times*, at Essen, states that the Borbeck open-hearth smelting installations and steel-rolling mills at the Krupps works there, which were relatively undamaged in the war, have now been totally dismantled by the Russians, and the last pieces of equipment will be shipped to Russia by way of the Mediterranean early in January.

The Borbeck plant is stated to be the most modern of its kind in Europe. It was built after the 1914-18 war and started production in May, 1929. It was granted to the Soviet Union by the other main Powers late in 1945.

The first large-scale allocation of equipment from the Krupps works to countries making bids under the Inter-Allied Reparations Agency in Brussels has just been made to Yugoslavia. The equipment consists of a gigantic forging press of 15,000 tons strain, believed to be the biggest in Europe.

LARGEST MANUFACTURER IN GERMANY

MR. Charles Luckman, president of the American branch of Lever Brothers, on his return to the U.S.A. after visiting Germany, claims that the combine is now the largest manufacturing organisation in Germany.

Shortage of raw materials, which must all be obtained through the Allied Military Government was, said Mr. Luckman, the reason why Lever Brothers' 54 plants in Germany were operating only at about 80 per cent of capacity. In addition to chemical plant, their activities in that country included textile manufacturing, margarine, perfume, cosmetics, plywood and their products.

Revised British Standards

Casein Glue, Tallow and Bone Grease

THE following revised standard specifications have been issued by the British Standards Institution.

BSS 1444: 1948, cold-setting casein glue for wood, which supersedes BS4V2, casein glue for aircraft purposes. The standard provides for glues which have a limited degree of water resistance, as well as those for which no such resistance is claimed. Tests are laid down for both types (2s. post paid).

Two other standards issued have been approved by the Oils, Fats, Greases (other than Petroleum and Tar and Soaps) Industry Standards Committee.

BSS 1282: 1948, home-produced technical tallow, defines this material in terms of its origin and general chemical characteristics, and provides details of preparing the sample for examination; the determination of the colour of soap, volatile matter, solvent, organic dirt, ash content, free fatty acids, iodine value, unsaponifiable matter, molecular weight and titre. Detailed notes are provided on the chemistry of the product and temporary relaxations in respect of iodine value and titre are permitted in view of present conditions (2s. 6d.).

BSS 1483: 1948, defines bone grease in the same terms and conditions as above (2s. 6d.).

Copies of these specifications can be obtained from the British Standards Institution (Sales Department), 24 Victoria Street, London, S.W.1.

PREVENTING GLASS DECAY

AMETHOD of preserving old glass was recently presented by Prof. Arvid Hedvall, of Gothenburg, at the annual meeting of the Swedish Academy of Engineering Sciences.

The professor had verified that the chief cause of disintegration of glass is crystallisation and also by reactions between the calcium compounds and alkali of the glass with the water and carbon dioxide of the air. Prof. Hedvall's method comprised two stages: the evacuation of the glass to remove enclosed or dissolved gases, and the application of a special plastic compound which is absorbed by cracks and cavities and seals the glass against air and moisture.

Investigation also showed possible means of treating other ageing materials such as tin, bronze and steel, and methods of dealing with the cracking of old oil paintings.

Safety matches will shortly be manufactured in a factory now being equipped by a recently-formed company near Cape Town.

Hard-Facing Electrodes

Two New Types Available

TWO new electrodes known experimentally as BN21 and CB5, have, after extensive trials, been included in the list of established, hard-facing electrodes supplied by Murex Welding Processes, Ltd.

BN21, now known as Hardex OHR, yields a corrosion and heat-resisting deposit specifically designed for hard-facing parts exposed to abrasion at high temperatures, such as the facing of coke oven pusher rods, subjected to approximately 1100°C.

CB5, listed officially as Hardex 800, is used for applications on mild or medium steel machine parts and tools and meets the demand for maximum hardness in the as-welded condition—the high figure of 800 VPN being obtainable.

Murex has taken this opportunity of revising the nomenclature of its standard hard-facing types. All bear the generic name of Hardex, followed either by a number, indicating the typical hardness on mild steel in VPN, or by letters showing the particular property or application. The following list gives the new name, with the former appellation in parentheses: Hardex 250 (Roxel 2); Hardex 350 (Roxel 3); Hardex 650 (Hard Surfacing); Hardex 800 (CB5); Hardex OHR (BN21); Hardex T (Hardex).

INDIAN STEEL SCARCITY

TOTAL steel production in India during the quarter July-September this year was 211,050 tons. The production figures for the first two quarters of the year were 224,600 tons and 201,700 tons respectively.

The decline in the two quarters is attributed to breakdown of machinery of the S.C.O.B. undertaking, which has resumed normal production from September. The production for this year will be 825,000 tons, it is estimated, a figure which compares unfavourably with the production figure for 1947, a year of universal under-production, which was 868,580.

The need existing in India at present being 2.5 million tons of steel, double the present capacity and treble the actual production, the Government has been for some time past confronted with the problem of importing as much steel as possible with the limited foreign exchange resources available.

India has to depend mainly on the United States of America and the United Kingdom for her imports though there is evidence of their availability to some extent from Canada and Belgium.

Alleged Noxious Emission

Medical Research Council to Report

THE prospect of far-reaching action resulting from the legal process in Edinburgh relating to the North British Aluminium Co.'s activities was referred to by Lord Morrison in a written reply to a Parliamentary question by Viscount Stonehaven.

The questioner asked why publication of the report of the committee of the Medical Research Council investigating the case against the North British Aluminium Co., Ltd., Fort William (THE CHEMICAL AGE, December 11) had been so long delayed, when extracts were said to have been received by a certain local authority.

The report of the committee of the Medical Research Council, said Lord Morrison, which had been investigating the medical and veterinary aspects of the matter, had recently been completed.

Compilation Difficulties

Delay was to be attributed to the fact that there had been some difficulty in compiling and editing the report in its final form, as it is based on the contributions of a number of individual investigators. It was, however, now with the printers, and would be published in January.

The whole matter would be considered as urgent as soon as the legal action, at present before the Court of Session, had been determined.

FATAL FUMES

THE American Steel and Wire, a subsidiary of the United States Steel Corporation, discloses that plans have been completed for the re-opening of its Donora Zinc Works, Donora, Pennsylvania, which was closed voluntarily by the company on October 31, pending the outcome of the investigation by health authorities into the recent "smog" which was held responsible for the death of 20 Donora residents.

Health authorities have announced that continuing control measures have already been started in order to insure against recurrence. Samples of the atmosphere are being taken not only in Donora but in the entire general industrial area, at various times of the day under varying weather conditions. A constant check will be made, health authorities state. There will not be a repetition of this disaster, and there is every reason to believe that a spot check will indicate any build-up of atmosphere before harmful concentrations can be made.

Chemical Fertilisers

Western Europe's Production Rising

THE production of chemical fertilisers in Western Europe during 1948-49 is expected to be almost double the pre-war figure, states a report from the office of the U.S. special representative from ECA. During this period, ERP countries estimate that they will be able to produce 1,345,000 tons of nitrogen. Last year they produced 1,095,000 tons and in the 1935-38 period the total was 760,000 tons.

Estimated deliveries of phosphate rock from North Africa during 1948-49 will be 70 per cent higher than the 1935-38 average, and 10 per cent more than last year. A 29 per cent increase in potash production in Marshall Plan countries is expected.

Overproduction Foreseen

The possibility that the generally accepted view that current production of agricultural nitrogen will be much less than world demand may not be correct is raised in the annual report on the nitrogen industry by Aikman (London), Ltd.

This recalls that the FAO estimated total requirements for 1948-49 at 4.061 million tons compared with 3.62 million tons for 1947-48, when actual consumption, owing to shortage of supplies, was only 2.7 million tons. This estimate apparently included about 1 million tons for Asia, whereas allocations for this continent were only about half that quantity, and it is doubtful whether more could have been disposed of owing to lack of finance. World production during the current year is estimated by the FAO at 3.083 million tons and by Aikmans at 3.114 million. In addition, some 19,000 tons will be exported from Russia and the Russian zone of Korea, making 3.133 million tons available for world fertiliser consumption in 1948-49.

"It is probable," Aikman (London) state, "that larger quantities could have been consumed in the United States, Egypt, and certain European countries than their available supplies, but we do not believe more than 3.25 million tons could have been absorbed this year owing to the difficulties of arranging payment in foreign currencies for the imports that would have been required. This figure compares with the FAO estimate of 4.061 million tons, which in our opinion could never have been consumed unless long-term American credits had been given on a large scale."

Change of Address.—Protolite, Ltd. (a subsidiary of Murex, Ltd., of Rainham, Essex), advises that it has now removed to new offices at 144 St. Vincent Street, Glasgow, C.2.

Vinyl Chloride from Dichloroethane

Experiments with a Pumice Catalyst at High Temperature

FURTHER light on the production of vinyl chloride by the dichloroethane method, which has been developed chiefly in the U.S.A. is contained in the results of experimental work by C. Rossi, of the Industrial Chemistry Institute, of Milan.

This is represented by a preliminary note (*La Chim. et l'Ind.*, 1948, 30, 269-271) on work concerned chiefly with the use of a pumice catalyst, at relatively high temperatures, up to 630°C.

The reaction was endothermic and, in order to avoid the use of metal with possible catalytic disturbance, quartz apparatus was used. Comparative tests were also made with activated carbon, both fresh and used, at 350°C. Particular attention was paid to the rate of feed of dichloroethane in relation to the amount of catalyst.

Tabulated results show that with carbon, the reaction took place at the relatively low temperature of 350°. A rate of feed of dichloroethane above 500-600 g./hr. did not increase the yield of vinyl chloride which, in the carbon catalyst tests, ranged from 65.4 to 90.4 per cent calculated on the amount of dichloroethane reacted.

Raising the temperature with the used carbon catalyst gave rather poorer yields of vinyl chloride. Thus, at 500°C., with a feed in of 1550 g./hr., the yield of vinyl chloride was only 60 g./hr., while at 350°,

and a feed of 600 g./hr., the yield was 130-140 g./hr.

Interesting results were obtained with pumice catalyst at higher temperatures. Its activity is attributed in part to adsorption of the HCl formed, and this activity was not lessened by some deposition of carbon on the catalyst. Percentage yields of calcium on dichloroethane reacting ranged from 75.5 to 90.

In one case at a temperature of 500°, and a feed rate of 37 g./hr., the percentage of dichloroethane reacting was 71.8 and the yield was 89.6 per cent. But the highest velocity of reaction was obtained at 630°, when, with a feed rate of 2210 g./hr., practically all the dichloroethane reacted and the yield was 90 per cent (1260 g./hr.).

The unique structure of the catalyst no doubt plays a very important part, and is the subject of further research. It certainly permits a much higher velocity of working and thus reduces the risk of secondary reactions. Immersing the catalysts in such solutions as chromium chloride had little effect. Secondary reactions will be reported in greater detail later.

Meantime, it can be said that, so far as the unreacting dichloroethane is concerned, this can usually be re-cycled without further treatment. The gaseous waste products (about 10-15 per cent) are mostly acetylene, ethylene, hydrogen, etc.

New French Procedure for Sulphuric Anhydride

ANOTHER recent foreign application for an English patent (No. 34094/1947, Conv. date September 17, 1945, by Fassina and Fassina, of Paris) describes the direct production of sulphuric anhydride (the trioxide) from pyrites. The iron sulphide mineral, such as pyrites, is reduced to a 100 mesh powder and an oxidising agent is added in approximately equal proportions in the form of finely powdered manganese sesquioxide (Mn_2O_3), with which a certain amount of impurity may be associated, e.g., silica, as in braunite.

The mixture is heated in a rotating cylinder, first to about 400°C. and an air current is used to remove into suitable receivers arsenious, antimony or other impurities. The purified sulphurous gas passes into other receivers and the sulphur trioxide then combines with the Mn sesquioxide to form manganese sulphate. The furnace is then connected to receivers containing concentrated acid of 66° Bé, and the

temperature is raised to 700°C., the sulphur trioxide vapours being absorbed.

If another oxidising agent is used, such as polianite, a somewhat different reaction takes place and manganese sulphate and ferric oxide are formed. One special application of the process is in the treatment of concentrates of arsenious auriferous pyrites.

Improved Pump Design

High speed pumps and gauges for continuous production purposes have in recent years become increasingly important in chemical, metallurgical and electronic industries. The Type 903A oil diffusion pump and combination baffle valve described in their latest catalogue by W. Edwards & Co. (London), Ltd., can utilise silicone apiezon oil or other pump fluids. It is a three stage water-cooled pump with the special feature of an integral "booster type" third stage.

SULPHURIC ACID PATENTS

Improved Italian Methods Claimed

At the recent 21st Congress of Industrial Chemistry in Brussels, Guareschi read a paper on the constitution of high nitric sulpho-nitric acids used in intensive manufacture of sulphuric acid, and developed some new ideas on SO_2 oxidation. These included the formation of a persulphuric radicle in the sulpho-nitric molecule to catalyse the reaction. The composition of the nitrous atmosphere with a high N_2O content is that of a compound which sets free large amounts of oxygen during the reaction. Some experimental results were adduced in support of this view.

These and other ideas have been embodied in several patent applications lodged during this year and last in this country, in the name of Guareschi and his associates, Maragliano-Busseti and others in Genoa.

The use of a nitrogen oxide to supply the necessary oxygen for conversion of SO_2 to SO_3 is of course a well known feature of one of the oldest methods of sulphuric acid manufacture: (e.g., Newth's *Inorgn. Chem.*, 1898 edit., pp. 387-390).

This particular reaction has also formed part at least of the basis for the combined manufacture of sulphuric and nitric acids as developed by Kachkaroff and others in Italy and France, and which formed the subject of a further paper by Salsas-Serra at the Brussels conference (*THE CHEMICAL AGE*, December 11).

Guareschi's English Patent

In his first English patent application No. 1506/1947 (Conv. date January 16, 1946, Italy), Guareschi claims an improved method for the production of oleum (SO_3 dissolved in conc. H_2SO_4) by catalysis, whereby plant and operation are simplified, considerable economy in cost and space is ensured, including, in particular, lower heat requirements. It is pointed out that one of the most serious difficulties hitherto has been to secure satisfactory absorption of the gaseous sulphuric anhydride (SO_3) in the acid, which usually required a large number of absorption towers, involving higher costs and greater expenditure of fuel to raise and maintain the required temperature of 450° for effective catalysis.

In the present invention the mixture of gases from the pyrites furnace (SO_2 , O_2 , N_2) is freed from impurities, such as As , H_2O , etc., in the usual way, and then either the SO_2 or all the constituents of the gas mixture are liquefied. If the SO_2 only is liquefied the oxygen may be separately treated.

Or the constituents may be liquefied in sequence, beginning with the SO_2 .

In either case the gas mixture is reduced to the form of $\text{SO}_2 + \frac{1}{2}\text{O}_2$, and is led into a heat recuperator attached to the pyrites furnace where temperature is raised to $450-480^\circ\text{C}$.

Owing to the high concentration of gas, catalytic reaction takes place with much better yield than usual.

Evaporating Liquefied Gases

The liquefied gases may be evaporated by causing them to expand in two heat recuperators which bring about preheating in countercurrent, simultaneously with pre-cooling of gases coming from the furnace.

In the English patent No. 34960/1947 (Conv. date January 16, 1946) the claims are somewhat similar to those for oleum manufacture, but instead of the SO_3 being absorbed by the acid in a gaseous state it may be liquefied and solidified, and dissolved in this form in a mono-hydrated sulphuric acid (98 per cent), solution. In this way all bulky and costly plant parts, such as absorption towers, are eliminated.

English patent No. 35007/1947 (Conv. date June 26, 1939), in the name of G. Maragliano-Busseti and Lucia Pette-nati, for the intensive manufacture of sulphuric acid, relates to a method in which nitrogen oxides are used as reaction accelerators.

The four stages in the usual process are:

(a) formation of chamber sulphuric acid; (b) recovery of nitrogen oxides; (c) liberation of recovered nitrous products and return into cycle; and (d) acid concentration to about 60°Bé .

In the present invention sulphuric acid is formed simultaneously with the recovery of the nitrogen oxides liberated. The SO_2 is in closest contact with nitro-sulphonic acid (nitrosyl sulphate) dissolved in the sulphuric acid of over 60°Bé . As the reaction is at first very vigorous, nitrogen oxides are set free in bulk, and most are oxidised almost as soon as they are liberated.

Much of this is N_2O , and is absorbed, while NO or NO_2 in excess and not readily absorbed passes into the gaseous mixture. It is subsequently absorbed in the direction of the gas stream as N_2O , mixed with some NO . Thus, by suitably varying the amount of nitrosyl sulphate, the composition of the sulphurous gas mixture, and the temperature, the two phases become practically

(Continued at foot of next page)

Economic Acid Recovery

Patent Process Using a Common Waste Liquor

THE prospect of making profitable use of bulk quantities of waste sodium sulphate liquor for the production of sulphuric acid and common salt is held out by a process for which Krebs & Co., Ltd., Zurich, have filed a patent application here (E.P. 30216/46; Conv. date June 18, 1946). The process is based upon the familiar principle of heating sodium sulphate or bisulphate with hydrochloric acid.

It has been necessary hitherto to concentrate the acid formed to 70-75 per cent with complete removal of the HCl, and this adversely affected economic working.

It is now shown that solid sodium sulphate, i.e., Glauber salt, or the bisulphate, can be treated direct with HCl with almost theoretical yield, forming the basis of a new process.

Glauber salt obtained by evaporation and crystallisation from the waste liquors is naturally of high purity, and yields at once a highly concentrated acid, from which therefore much less water has to be removed. It is also possible to use

partially dehydrated sodium sulphate as the starting material.

The reaction takes place in a suitable acid-resistant container surrounded by a cooling jacket, in which gaseous HCl is passed with steady stirring. There is first a drop in temperature, and the mass begins to melt at about 8°C. without separation of anhydrous sulphate.

Further addition of HCl provokes strong heating and NaCl is slowly precipitated. The addition of HCl and stirring is continued, while the water is circulated through the cooling jacket and reaction products are cooled until the salt is completely precipitated. The residual liquor is separated by centrifuging or filtration and suction.

Alkali Chloride Electrolysis

After further washing with aqueous HCl and evaporation, sulphuric acid of 75 per cent concentration is obtained. Most of the HCl used is recovered as gas and passed back into cycle. This process can be combined with alkali chloride electrolysis in a continuous closed cycle. It is only necessary to replace small losses of HCl.

A second patent application by the same firm (No. 30217/1946, Conv. date June 25, 1946) claims to permit the simultaneous production of sulphuric acid, HCl and NaCl from sodium sulphate or bisulphate waste liquors by another method.

As soon as the solution has been sufficiently saturated with HCl, NaCl begins to precipitate, and can then be filtered off and collected. HCl formed in excess can also be separated from the sulphuric acid, and both acids obtained pure. In order to remove completely the HCl and any initial gas mixture, the sulphuric acid must be concentrated to at least 70 per cent. This, as in the previous case, also unfavourably affects the economy of the method.

It has now been found, as in the preceding patent, that the reaction can be carried out with solid sodium sulphate, and the sulphur dioxide can be replaced by elemental sulphur; or sulphur trioxide can be led in. A further variation is treatment of Glauber salt with HCl; the precipitated salt is filtered off and chlorine and sulphur dioxide passed in. Thus, both sulphuric and hydrochloric acids are formed, concentration of the former being at least 60 per cent without evaporation. Small losses of chlorine and sulphur dioxide must be replaced.

SULPHURIC ACID PATENTS

(Continued from page 849)

simultaneous and in much reduced volume.

The English patent No. 35008/1947 (Conv. date November 26, 1946—P. Guareschi, G. Maragliano-Bussetti and Lucia Pettenati) is for the manufacture of sulphuric acid, in which special apparatus is more specifically claimed. One of the systems already used is described, with some modifications, consisting of parts: (a) denitrating tower of Glover type, fed on one side with nitrosyl sulphate—two of such towers may be worked in parallel; (b) several absorption towers filled with Raschig rings and working in series, the first of which receives from the denitrating tower a mixture of SO₂ and nitrogen oxides, while remaining towers receive mixture richer in nitrogen oxides; (c) one or more recovery towers. In such a system there is inter-dependence between the various parts.

The following advantages are claimed: (1) better control of plant; (2) arrangement in parallel of two Glovers with distinct functions; for the second tower makes the recovery towers independent of acid concentration, so that plant operation is much more elastic; (3) one of the Glover towers instead of being connected exclusively with the first production tower is connected in parallel with all the towers except the last one; (4) improved cooling arrangements; and (5) more compact plant,

ELECTROLYTIC SACCHARIN

Rumanian Reports of Purer Yields

ONE or two substantial improvements of existing practice of producing saccharin by electrolytic oxidation of *o*-toluene-sulphonamide are foreshadowed by recent work in Rumania by I. A. Antanasiiu. He has lately reviewed the experience of some of his predecessors and presented his own findings in the *Bulletin of the National Research Institute of Rumania* (1948, 3, 29-36).

The first patent for direct electrolytic oxidation was that of Haydens in 1895, using an alkaline bath (NaOH); followed by the method of Sebor in 1903 and by Fichter and Löwe's in 1922. In 1930, F. Halla studied variations in yield with an anode structure; and in a Dutch patent (No. 42,338, of 1937) a method was claimed using borax or an alkaline perborate solution (pH 12) and c.d. of 0.02-0.05/cm², whereby a saccharin concentration of 18 per cent is said to have been obtained.

Among these, Löwe's work is probably the most interesting (*Helv. chim. Acta.*, 1922, 5, 60; English patent. 174,921) but his yields are said to have been low and variable, due to factors not mentioned in the patents.

Antanasiiu now enumerates these as: electrolyte temperature, *o*-toluene-sulphonamide concentration of solution, purity, cathodic action of hydrogen, and the nature of the anode.

Preventing Anodic Oxidation

To obtain maximum yield it was found that the saccharin as formed must be protected against action of anodic oxygen and cathodic hydrogen, a matter of some difficulty, in view of the solubility of saccharin in alkaline medium. Fichter and Löwe had shown that there was no anodic oxidation of the saccharin so long as there was sufficient sulphonamide in solution to act as a depolariser more powerful than saccharin.

It has now been found that the requisite minimum of sulphonamide in solution is 2 per cent, and for this the temperature mentioned by Löwe (60°C.) must be raised to 75°C. Between that and 85° the yield ranges from 50 to 70 per cent, according to conditions of working and purity of material. With increased yield of saccharin the high temperature increases concentration of *o*-toluene-sulphonamide and prevents oxidation of saccharin.

Some results obtained by Halla at temperatures of 95-100°C. are recorded (*Z. Elektrochem.*, 1932, 36, 96). Halla used with good results a gold anode, giving high over-voltage for oxygen in alkaline medium, while Löwe used a platinum anode. The

latter, for various reasons, is preferable.

Antanasiiu tried also iron, lead, or tin anodes, with negative results. Of these, the first two gave over-voltage (anodic) but this apparently is not the only factor to be considered, and catalytic action of the metal surface must also be taken into account.

In the present work a voltage of 9-12 was used, according to the extent of immersion of the cathode; and it is shown, despite what Löwe has recorded, that cathodic hydrogen can reduce saccharin in an alkaline medium. This was found also by the Japanese workers, Matsui *et al.* (*Mem. Coll. Sci. Kyoto Univers.*, 1932, (A)15, 161) using a lead cathode. Antanasiiu avoided this by only slightly immersing the cathode, which allowed the hydrogen more readily to escape but considerably increased bath resistance and terminal voltage.

Time Factor

The period of electrolysis should be slightly longer than that required theoretically for oxidation deduced from Faraday's law, under normal conditions. Saccharin is a good anodic depolariser, and the anodic potential increases with time, so that for both these reasons oxidation of saccharin is increased. Another important factor is purity of the starting material; impurities produce various undesirable effects.

The best results were obtained with *o*-toluene-sulphonamide (*o*-sulphobenzimide) of m.p. 115°; only indifferent results were obtained with one of m.p. 148°. A short preliminary electrolytic oxidation was found useful. By cooling the solution, a product of greater purity was precipitated for use in the main electrolysis. But this purifying method involves some loss of material.

Saccharin obtained by electrolysis is purer than that produced chemically, but retains a slight wash-leather colour which is difficult to remove. Purification by crystallising the sodium salt may be effective.

Indirect electrolytic oxidation was tried for the first time by Halla (*loc. cit.*) in presence of sulphuric acid with permanganate or bichromate of potassium as oxidant; although, according to Löwe, this leads to oxidation of the sulpho group. It is better to describe the method as chemical oxidation followed by electrolytic recovery of the oxidant used. These can only take place in the same space or vessel if the rate of oxidation of sulphonamide by the oxidant is greater than that of saccharin by anodic oxygen. With excess of sulphonamide this may be avoided.

Potentialities of Powdered Rubber

Revival of Interest and Investigation

by T. R. DAWSON, M.Sc., F.R.I.C., F.I.R.I.*

IN the mid 1930's there was very considerable activity in regard to the production of raw rubber in the form of a fine powder, centred mainly on the ill-starred Rubber Latex Poeder Cie, N.V. Many attractive applications were conceived and promised for such a product, but the whole matter faded away in the face of some economic or technical flaw in the powder production process.

Current Research

For a decade the question has languished, not because of any known failure in the suggested uses of rubber powder, but because no bulk supplies of powder were forthcoming. Comparatively recently there has been a considerable revival of interest in rubber powder, and there have been new investigations which merit attention.

The powder on which attention formerly was fixed was marketed under the name of "Pulvatex" by the company mentioned and its British offshoot, the Rubber Powder Co., Ltd. It was never completely certain which process was definitely used in its production, as the companies always had two methods under full discussion.

The newer powder, which figures prominently in the revival of interest, is known as "Mealorub," and comes from work of the West Java Proefstation. This powder is prepared from fresh field latex, vulcanised, flocculated, the floc collected by centrifuging, the cake dried and disintegrated.

"Pulvatex" powder is very free flowing, about 200 mesh. An expected advantage of easy mixing by simply stirring rubber powder with powdered ingredients did not materialise. Satisfactory mixings are obtained only by adding very considerable proportions of a fluxing agent such as naphthalene, or by strong mechanical grinding, which may consume more powder than sheet or crêpe, as in the case of Hopkinson spray-dried rubber.

The more recent "Mealorub" powder differs in many ways. The dry powder can be crêped easily on an ordinary rubber mill, and is sufficiently self-adherent, although vulcanised, to bond well together. It does not, however, easily accept plasticising agents to adjust its consistency. When mixed as part of a normal vulcanisable stock with other raw rubber it vulcanises faster

than usual and gives quite sound mechanical and ageing properties. Solutions can be obtained only at 150°C., and have no adhesiveness; at low temperatures the particles break up and form fine dispersions in the solvent.

Main interest in the current period of revived attention has come from the Rubber Stichting's important use of "Mealorub" in major road surfacing experiments. Other proposed uses fall mainly in the domain of using the powder as a raw material for chemical developments such as easier production of rubber derivatives, or possibly of rubber plastics. Not much has been done so far.

Many uses, on the other hand, were put forward for the raw rubber powder "Pulvatex," and failed to materialise only because there was no free supply of powder. Potential uses are well worth further consideration.

Fine rubber powder can easily be sprinkled, sprayed or otherwise applied as a rubber protective covering on all types of articles. Such coatings can be cold-cured, or if vulcanising agents are incorporated, can be moulded and heat-cured. Coatings resistant to corrosion or to shock and blows are readily suggested, with obvious possibilities for colouring and decorative effects.

The field of "compositions" naturally has few limitations, and rubber powder as a modifying agent, or as a bonding agent, presents many opportunities for useful effects. Direct mixing by simple stirring together of rubber powder and filler powders, pigments, fibres, etc., has not so far been successful, but it does not follow that simple mixing processes with the help of auxiliary agents, wetting or adhesive agents, will not eventually be discovered.

Pigmentation

Rubber powder also lends itself to numerous new decorative effects and finishes. It can be pigmented in a wide variety of colours, and rendered susceptible to taking varnishes and lacquers in different ways. There is also the possibility of treating the powder chemically to transform its surface only to derivatives with useful properties, thus offering surfaces that are resilient and rubbery, but of exceptional resistance.

It is, in fact, certain that once rubber powder is definitely available at reasonable price, there will be a decided volume of novel applications.

* From *Rubber Developments*, Vol. I, No. 6. December 1948, issued by the British Rubber Development Board, Monk Lane, London, E.C.3.

POZZOLANA CEMENTS

Recent Results of Italian Research Programme

IN an attempt to clear up some of the difficulties arising from the wide differences of opinion regarding the underlying chemical or physical changes which take place during the manufacture or use of pozzolana cements, A. Cereseto and A. Rio are undertaking, in the laboratories of the Soc. Ital. per la Produzione Calce e Cementi di Segni, Colleferro, near Rome, an extensive programme of research on these materials, in collaboration with various other scientific institutions, including universities, in Italy. In a preliminary article (*La Chim. e l'Ind.*, October, 1948, 30, 261-4) they survey some of the theories and recent work in this field.*

Some of the controversy which centres around this subject appears to have arisen over Vicat's original hydraulicity index, or as it was later called by Lafuma, the chemical resistance index, the main uncertainty being the manner in which all the lime present or set free is absorbed. It seems, at all events, to be agreed that a pozzolana cement of good quality fixes all the free lime, possibly or mainly as hydrated monocalcium silicate, thus increasing stability and chemical resistance.

In any case, the present standard specifications in Italy stipulate that the amount of pozzolana present shall contain enough silica and alumina to take up all the lime present or set free during manufacture or use (in setting or hardening).

Principal Factors

In such specifications the chemical resistance index and insoluble residue are among the principal factors and limit the risk of adulteration. Vittori and Cereseto had earlier supported the view that hydraulic activity is largely governed by solubility, especially with leucitic pozzolanas (*La Chim. e l'Ind.*, 1936, 17, 646), subject, however, to some exceptions. At that time the generally accepted theory was the formation of stable and resistant compounds between the lime freed by clinker hydrolysis and the acidic elements of the pozzolana constituent.

In recent years this view has been questioned, notably by German research, which attached considerable importance to zeolithic formation and action; that is to say, some sort of physical exchange between the lime and the pozzolanic elements. This is

the view of, for example, Wittekind and Biehl, who studied the trass or tuff of the Rhine district by treatment of these with calcium nitrate solution and observation of lime movements and changes.

Other workers along similar lines were Tannhäuser, Steopoe, Sestini and Santarelli—the first two with German and the others with Italian material (from Phlegra, Latium, etc.). These latter agreed that, although zeolithic action may take place, it is by no means a complete explanation.

Zeolithic Material

Still more recently Tavasci (*Il Cemento*, February, 1946, 28), in a petrographic study of the segni pozzolanas found evidence of zeolithic material, e.g., constituents of the philipsite and cabasite type which are mainly calcic, while the sodium kind were absent; and subsequently (*loc. cit.*, June, 1947) he found hydrated tricalcium aluminate with 11-12 H₂O. Tavasci thinks there is not definite stable formation, but rather a series of compounds of variable composition, among which the hydrated calcium silicate probably predominates, similar to the natural di-silicate, okenite: CaO, 2SiO₂, 2H₂O.

The special significance of the lime/silica ratio has also been studied by many others, including Le Chatelier, Cirilli, Beilich, Lea, and Buessem. There are also the mechanical effects of pozzolana in cements to be considered, e.g., on density and permeability.

The complex changes taking place, therefore, especially in the setting and hardening process, may be of a threefold nature: mainly physical through particle size, surface action, etc.; chemico-physical; and essentially chemical in formation of lime-pozzolana compounds. It seems, then, that the lime may be chemically combined and also physically held by surface adsorption.

Chemical Resistance

Although the predominating action may be that of a solubilising nature between the lime and acidic elements, and may partly explain the course of the hardening curve, it does not altogether account for the high chemical resistance of these cements. In this connection the views of Ferrari (no reference) and Steopoe are cited, including the assumption of a protective film, with hydrosilicates as the essential constituents.

Under the action of aggressive liquids such a film may decompose into lime passing into solution and an insoluble silica gel tending to increase in volume.

* Related fundamental considerations affecting the production and behaviour of cement appeared in *THE CHEMICAL AGE* this year on March 27, page 428, May 1, page 611; and July 10, page 52.

Overseas News Items

Uranium in Australia.—A "promising" discovery of uranium in the Peake and Denison ranges of Central Australia, south of the township of Oodnadatta is reported by the Australian Department of Mines. An area of 2600 sq. miles round the find has been reserved for Government prospectors only.

Sunflower Scheme in Tanganyika.—55 per cent of the acreage at Kongwa is to be devoted to sunflowers and the remainder to groundnuts, it has been stated by General Harrison, resident member of the Oversea Food Corporation in East Africa. This is due to the fact that sunflowers are a good rotation crop, and will grow well on land not completely cleared of roots.

Full Production of U.S. Steel.—Operating at 99.9 per cent of theoretical capacity—the highest monthly rate since October, 1943—steel mills in the United States in October, 1948, turned out 7,973,416 net tons of ingots and steel for castings. That output exceeded the peak of March, 1944, by more than 147,000 net tons, according to the American Iron and Steel Institute.

Industrial Troubles in Italy.—Growing unemployment in Italy is reported to be having a serious effect on industry and falls in output have been seen in several sections of the chemical industry. The Government has had to grant a 600 million lira subsidy to the Societa Carbonifera Sarda to keep the mine going. There has been some doubt whether extraction can be economically continued.

Plastic Piping.—An extruded plastic pipe which can be bent and threaded has been placed on the market by the United States Rubber Co. Known as Kralite, the plastic pipe is said to be suitable for handling alkalis, non-oxidising acids, and aliphatic hydrocarbons, but not ketones, esters or aromatic hydrocarbons. Sizes range from $\frac{1}{4}$ in. to 2 in. outside diameter, and can withstand pressure up to 125 p.s.i.

Canada's Petroleum for U.S.A.?—The new oilfield at Redwater, Alberta, may confer on Canada's Prairie Provinces self-sufficiency in petroleum by 1950. In August, 1948, production in the Ledue, Lloydminster and Turner Valley fields was running at approximately 35,000 barrels per day, twice the August, 1947, figure. It is anticipated that, by the end of this year, production in these three fields will have increased to 45,000 barrels. It is possible that oil may ultimately be exported to the northern parts of the U.S.A.

Phosphate Development Project.—The development of the phosphate deposits at Dorowa, in the eastern district of Southern Rhodesia, by means of a pilot plant, is under consideration. An annual output of 20,000 tons by 1950 is anticipated, but it has not been determined yet whether the proposition would be a commercial success.

Nitrogen Fertiliser for Germany.—The Linz Nitrogen Works has expanded its loading equipment for chemical fertiliser, partly to facilitate shipments to Western Germany. Shipments, which began in November, aggregate 600 to 700 tons per day. The Linz works hopes to ship some 25,000 tons of nitrogen fertiliser to Germany in the remaining weeks of this year.

U.S.A. Needs 500 m. lb. More Aluminium.—Demand for aluminium in the U.S.A. is estimated to exceed 1948 production by 500 million lb., although present output is more than four times pre-war levels. The Aluminium Association, a private organisation, reports that nearly 1000 million lb. of primary aluminium were produced in the U.S.A. in the first nine months of 1948.

Resistance to Demolitions at Krupps.—In an attempt to save the 73 buildings scheduled for demolition in the Krupps undertaking at Essen, the local town council has appealed to the British Military Government to reconsider the whole demolition programme. This proposed to demolish 22 additional buildings, unless the Germans could redesign them for peaceful purposes, and to preserve 127 for light industries.

Hardwood for Rayons and Plastics.—Research by the International Paper Company of America is stated to have yielded a new process which enables hardwood trees to be utilised for the production of pulp to manufacture rayon, cellophane, plastics and other synthetic products. Mr. John H. Hinman, president of the company, claims that the hardwoods not only yield products of superior strength, but can also be processed more rapidly.

Scrap Aluminium Allegations.—A very marked rise in United Kingdom exports of scrap aluminium to the U.S.A. in the first 10 months of this year—to 111.3 million lb. compared with 3.49 million lb. in the whole of 1947—was reported by the Department of Commerce in Washington last week. The figures were produced in support of recent criticisms in the U.S.A. that British trading policy in respect of aluminium was being operated to the detriment of American interests and of Marshall Aid.

PAKISTAN'S CHEMICAL PROJECTS

Many New Industries Proposed or Started

By G. A. BROWNE*

PAKISTAN, mainly an agricultural country, has nevertheless a wealth of minerals, petroleum and water power awaiting development. Machinery, technical knowledge and some raw materials are required to establish new industries and develop others, and the Minister of Finance has invited foreign capital to participate in fulfilling this aim.

Interest has been shown locally in the establishment and development of the pharmaceutical industry. While some parties purpose beginning in a modest way with the packaging of drugs imported in bulk, others purpose making use of the local raw material available in the preparation of pharmaceuticals and drugs.

The Government is considering whether it should not acquire, by direct participation in the financial structure of the industry, some control through its representatives on the boards of directors over the quality and price of the products.

The highest importance is attached to the establishment of an up-to-date paper factory in Pakistan, preferably in East Bengal. The main raw materials required for making paper are available in abundance in that province.

Sugar

The development of sugar and other industries has also received attention. A 50,000-ton sugar factory is now being erected at Mardan, in the N.W.F.P., and is expected to be in production next year. The question of using molasses from the sugar industry is receiving attention, and a proposal to erect a power alcohol plant, with a capacity of 3000 gallons per day, is now under active consideration. It is expected that orders for such a plant will be placed at an early date.

Licences have been issued to three parties for the establishment of sulphuric acid plants in Pakistan. Orders have already been placed for two 10-ton contact plants, one in the United Kingdom and the other in the United States. Both plants will be in production next year, one at Karachi and the other at Rawalpindi. Two other private firms are interested in estab-

lishing similar plants in Western Pakistan.

A 10-ton plant for the production of caustic soda by electrolysis is to be established in the next twelve months in Western Pakistan. This plant will also produce 8.8 tons of chlorine per day, which is sufficient to meet Pakistan's requirements for water chlorination, manufacturing bleaching powder and other products based on chlorine as the starting material.

Chlorine

As an additional safeguard to ensure regular supplies of chlorine for Karachi, the government has agreed to the establishment of a four-mercury-cell plant, capable of producing approximately five tons of chlorine per month. This plant, which will meet the full requirements of the capital, is expected to be in production within six months.

There is a soda ash plant at Khewra, which has a relatively small capacity.

Apart from coal, the government is anxious to make full use of minerals to be found in Pakistan, and has recently appointed a Director of the Geological Survey of Pakistan, with headquarters at Quetta. The minerals requiring special attention, apart from petroleum and coal, are: asbestos, antimony, chromite, copper, glass sands, gypsum, lead, limestone, nitrates, potash and other salts, sulphur and strontium ore.

There is much to be done in exploration and production methods, most of the practical mining done in Pakistan being rather primitive.

†ESTIMATED MINERAL PRODUCTION IN PAKISTAN

		Tons
Limestone	West Punjab	440,000
	Sind	365,000
Chromite	Baluchistan (Zhob)	25,000
Coal (lignite)	Sind (Kohistan)	10,000
	Punjab (Salt Range)	175,000
Fuller's earth	Baluchistan (Khost)	85,000
	Sind (Bukkur)	5,000
	Sind (Hyderabad)	550
Gypsum	Khairpur State	3,000
	Sind (Karachi)	2,000
	Punjab (Jhelum)	17,500
Iron ore	Baluchistan (Sibi)	6,000
	W. Punjab (Keonjhar State)	600
Petroleum	W. Punjab (Attock)	75,000,000
	Sind (desert deposits)	80,000
	Punjab (Salt Range)	700,000
Salt	Baluchistan	1,500
	N.W.F.P.	700
Stearite (soapstone)	N.W.F.P.	700
Antimony (stibnite)		300

† Latest available figures, 1944.

* Acting Canadian Government Trade Commissioner, in *Foreign Trade*, November 27, 1948, Vol. IV, No. 100, Ottawa.

Home News Items

Fruit Juice Imports.—Arrangements have been made by the Ministry of Food in agreement with the Board of Trade for the bulk importation under specific licence during 1949 of soft fruit juices from Australia and of citrus fruit juices from Australia and Sicily.

First Scottish Aluminium Bridge.—An aluminium footbridge, stated to be the first of its kind in Scotland, has been ordered by the North of Scotland Hydro-Electric Board for erection at Pitlochry to span the Tummel. The job is to be carried out in the Clutha Works, Glasgow, of P. & W. MacLellan, Ltd. The bridge will be made of special light-weight alloy, designed and rolled for structural purposes.

Demand for Chemical Plant.—Inquiries passing through the Engineering Centre, Ltd., last month showed a continued demand for chemical plant. Orders included: plant for atomic research from New Zealand, machinery for impregnation of tyre cord, rectifying stills, power cartridges, and many types of tools and instruments. From Spain came an inquiry for a complete chemical processing plant to produce cyanamide for fertilising product purposes. Keener competition from the continent is evidenced by offers from engineering concerns to undertake work for British firms.

Films for Industry.—Increasing use is being made by Imperial Chemical Industries, Ltd., of films including those made by the company's own film unit. The films are used to keep factory workers in touch with the wider aspects of their employment and the part which they played in chemical industry as a whole. The company last week showed a range of such films in their Ardeer chemical plant recreation club, including "Nobel Began It," which tells the story of Ardeer in documentary fashion, and "Rock of Industry," outlining the work of the I.C.I. lime division.

Scientific Food Production.—Chemical spraying as a method of disease control, correction of soil deficiencies, treatment of seed and destruction of pests from abroad were among the "Modern Methods in the Control of Plant Diseases," advocated by C. E. Foister, plant pathologist, Department of Agriculture for Scotland, speaking in Glasgow last week. Adoption of these and associated safeguards, such as certification schemes for growing crops, breeding for resistance, and controlled entry from abroad, could, he claimed, increase the value of 16 selected crops in Scotland from the present £56 million to £65 million.

Dunlop Benevolence.—The Dunlop Rubber Company has sent a donation of £500 to the YMCA War and National Service Fund; £200 to Toc H; 50 guineas to the British Sailors' Society, and £50 to the Soldiers', Sailors' and Airmen's Help Society.

I.C.I.'s New Copper Plant.—Key workers at Imperial Chemical Industries' 80 years old copper works on the River Irwell at Broughton, Lancashire, are expected shortly to move to the new model plant, the largest of its kind in Europe, now being built on a 50-acre site at Kirkby, Liverpool. The factory will eventually employ 3000.

Zinc Prices.—In a written reply to Mr. F. Jerroll, who asked in the House of Commons why it has been found necessary to increase the maximum prices of zinc and zinc products as outlined in S.I., 1948, No. 2592. Mr. J. Freeman said the maximum selling prices of zinc and zinc products have been increased because world prices had been increased.

Metal Powders Ignited.—Ignition of magnesium and aluminium powders above the works furnaces resulted in a fire difficult to subdue, except with large quantities of sand, at the works of the British Aluminium Co., Ltd., Latchford, on December 11. The bricks were red hot and had to be covered so that the powders could be removed. After two hours, during which workmen carried buckets of sand to the firemen, danger to a nearby oil feed line was averted.

Lead Mines Need Labour.—The annual report of the Weardale Lead Co., Ltd., Newcastle-on-Tyne, records that the labour supply has improved since the beginning of 1948, but that a further increase is essential to meet the company's plans and the increasing demand for fluorspar and lead ore. Production of fluorspar from the company's mines amounted to 7269 tons, and that of lead concentrates 268 tons, compared with 4548 tons and 178 tons respectively in the previous year.

Explosive Scrap.—An aircraft rocket 5 ft. long and weighing about 2 cwt., which was accidentally set off in the Clydebridge Steelworks, Glasgow, when being cut up for scrap, soared out of the yard, ricocheted off the main road, and landed in a field 1000 yards away, without causing any serious injury or damage. Several workmen were thrown to the ground by the blast, and as the missile skimmed across the yard it passed so close to another man that his hair and eyebrows were singed by flame from the tail.

Technical News and Services

A NEW heat-resistant "paint" which will withstand temperatures of more than 1000° F., has been developed by the Australian Council for Scientific and Industrial Research. The paint, according to the Australian Government Trade and Information Bureau, New York City, also gives greater protection against salt water corrosion, and it is claimed that ships painted with it will require far less repainting than formerly.

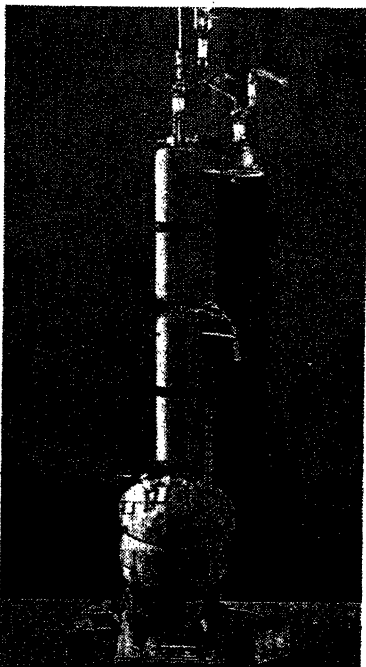
The non-inflammable basis of the new product is butyl titanate, produced from rutile and ilmenite, which are major components of beach sand deposits of New South Wales and Southern Queensland.

* * *

Many cleaning and sterilisation problems associated with dairy and similar plant have been eased in recent years by the introduction of stainless steel, monel metal, etc. Nevertheless, the dairy industry must regard the use of detergents as a vitally important and special branch of cleaning. In an attractively produced booklet *The Cleansing of Modern Dairy Plant*, Joseph Crosfield & Sons, Ltd., deals at length with various cleaning problems, the manner in which the technical service and advantages of the company's laboratories and research departments are available to their customers and lists six detergents specially formulated in the Crosfield chemical department at Warrington, Lancashire.

* * *

The latest issue of "Philips Technical Review," Volume 10, No. 1, recently available, contains much of interest to those concerned with lighting, electronics, X-ray and other technical subjects. The main article is entitled "X-ray Spectrometer with Geiger Counter for Measuring Powder Diffraction Patterns" by J. Bleeksma, G. Klovs and H. J. Di Giovanni. With the spectrometer described, X-ray diffraction patterns are traversed by a Geiger counter tube detector instead of being recorded in the conventional fashion on a photographic film; the paper is well illustrated with diagrams and photographs. The action of oxygen and nitrogen on iron and steel is dealt with by J. D. Fast under the heading "The Part Played by Oxygen and Nitrogen in Arc-Welding." This it is announced is an introduction to a future article in which the function of the coating of welding electrodes will be analysed.



Isomantle by J. W. Towers & Co., Ltd., Widnes, Lancs., claimed to meet the need for a safe flask heater for inflammable liquids which can be accurately controlled.

The Diamond Research Laboratory, Johannesburg, South Africa, sponsored by Industrial Distributors (1946), Ltd., is said to be the only laboratory in the world devoted exclusively to investigations on all phases of the diamond. In an admirably illustrated booklet arranged by F. L. Jonsson & Company (Pty.), Ltd., of Johannesburg, the scope of research, problems for investigation and laboratory facilities are described.

* * *

A new 12-pp. booklet describing the heat, chemical and weather resistant qualities of Plexene M, a modified polystyrene powder for injection moulding, has just been published by the plastics department of the Rohm and Haas Company, Philadelphia, Pa. Complete technical data on physical and mechanical properties, including its resistance to chemical solvents and reagents, are listed.

(Continued overleaf)

A list of periodicals which have resumed publication in Germany has been published by the Foreign Office (German Section), S.W.1, where it can be seen in the German General Economic Department. The list contains the surprisingly large number of more than 300 periodicals, divided in the following groups: Agriculture and Forestry (52); mathematics, physics, chemistry (46); medicine (84); natural science (46); technology and industry (84); details are given concerning editors, publishers, prices of subscription, etc. A list of the periodicals which are now being published in Austria is in preparation.

* * *

Further evidence of the expanding use of polyvinyl chloride in widely differing industries is contained in a statement issued by James North & Sons, Ltd., of Hyde, Cheshire, announcing the successful application of PVC to the manufacture of specially resistant gloves, well adapted to use in some chemical processes. The continuing acute natural rubber supply position after the war fostered and accelerated the research work in connection with and

the development of polyvinyl chloride, which was found to be the most effective substitute for the natural latex formerly used, for example, in cable covering.

When the process of manufacturing PVC had been perfected, the cable covering industry had first priority on all available supplies, and it was not until production had increased beyond the demand from this particular trade that supplies of PVC solution became available for other uses. Continued research evolved PVC paste, which James North & Sons, Ltd., adopted as a more satisfactory medium and installed a plant for the dipping and curing of PVC gloves. After many trials, the most suitable fabric base for this job was decided upon, and bulk quantities of PVC gloves based on this method of production became available early in 1947.

Since that date, the increasing demand for this type of glove from widely divergent trades has produced evidence of its standing up to abrasion, sharp materials, and an extensive range of chemicals, both acid and alkali, including anhydrous hydrofluoric acid. A patent has been applied for covering the whole manufacturing process.

Widening Production of Nylon and Rayon

THE spinning of nylon, an intricate process involving many interesting stages and the employment of skilled labour, is being carried out by the new Pontypool factory of British Nylon Spinners. The factory contains the biggest nylon-spinning plant in one building in Europe and is a very fine example of modern industrial architecture. Planning for the job has been the all-important consideration in the construction of the Pontypool factory, with the result that the flow of production is geared for ease and economy.

From 1941, when nylon was first spun in Britain, to the end of the war, all the yarn produced was used for parachutes and glider tow-ropes. Post-war development has already found a use for nylon in more than 100 different textile products. In fifteen months' time the Pontypool factory will be working at full capacity, and production of nylon yarn as continuous filament will then be 10,000,000 lb. per annum. There is also a good prospect of producing nylon staple in three to five years' time.

More Rayon Supplies

A new rayon factory, branch of British Celanese, Ltd., Derby, is to be opened shortly at Goose Green, Wigan, to supply manufacturers of rayon textiles in the area. The factory comprises one main single-span

production shed, and is expected to employ about 700 when it comes into full production on a two-shift system.

Genesis of an Industry

The genesis of the synthetic fibre industry was recalled in a talk given recently in Macclesfield, by Mr. N. Ward, chemist of British Erika, Ltd., Liverpool, to the local section of the Textile Institute. Only in the last 60 years, he observed, had man been able to make the fibres he needs.

The Comte de Chardonnnet in France in 1884 had perfected a process in which a solution of nitrocellulose in ether had been pumped through a fine jet into a water bath. Coagulating, it formed a continuous fine filament which closely resembled silk. This discovery, which aroused great comment, was quickly followed by others, and between 1900 and the Great War, factories sprang up all over Europe to exploit the possibilities of man-made yarns.

The early rayon yarns had all been lustrous and had had continuous filaments. Later, dull and matt yarns varied the filaments' appearance. Other types of yarns were invented, including fibres made of protein material from milk, peanuts or soya beans, and alginate yarn from seaweed. Today total production of synthetic fibres equalled the world use of wool.

American Chemical Notebook

From Our New York Correspondent

INSTALLATION of new plant by the I. B. F. Goodrich Chemical Company at its works in Port Neches, Texas, operated for the U.S. Government, will increase production of "cold rubber" to 30,000 tons annually. William S. Richardson, president of the company, stated that the increased capacity had been authorised by the U.S. Government agency, the Reconstruction Finance Corporation, which controls plants manufacturing American rubbers. It is expected that the new plant, which requires additional refrigeration, will be ready next year. The bulk of the production will go into tyre treads, but other uses are for conveyor belting and heavy duty hose.

* * *

The Reconstruction Finance Corporation announced recently that the former Government-owned neoprene synthetic rubber plant at Louisville, Kentucky, has been sold to E. I. Du Pont de Nemours and Company, Inc., for \$13.2 million. Under the agreement the company must maintain for national security purposes, a productive capacity in the plant of not less than 45,000 long tons of neoprene for at least five years.

* * *

A new system for eliminating radio interference caused by Inert-Arc welding, the result of five years' research, has been developed by the General Electric Company in America. The balanced wave welder dispenses with the continuous use of high frequency voltages by balancing the current with a bank of series capacitors, so that pure a.c. flows between the electrode and the work and cuts out the high frequency radio noise. The new method is stated to give a cleaner and more controlled weld, and result in a saving of argon gas used in the process.

* * *

A forceful plea for the continued U.S. support for the tartaric acid industry was recently made in Washington. P. W. Anderson, representing the industry, told the United States Tariff Commission and the Committee for Reciprocity Information that a reduction in the duty on this and allied products, would seriously embarrass the industry.

* * *

The steel capacity of the United States has increased 17.5 per cent, or more than 14 million tons, in the ten years since 1938, according to the new *Directory of Iron and Steel Works of the United States and Canada*, just issued by the American Iron

and Steel Institute. There has also been an increase of about 19 per cent in blast furnace capacity. Expansion and development programmes for the industry totalling \$1.7 million since the end of the war, are expected to increase production still further.

* * *

Production of inorganic chemicals in the United States for September, 1948, showed an increase over the same month of the previous year in 21 out of the 35 chemicals listed by the Bureau of the Census, U.S. Department of Commerce. Small gains in output were reported in synthetic anhydrous ammonia, ammonium nitrate, and hydrochloric, nitric, and phosphoric acids, but declines occurred in the production of calcium carbide, carbon dioxide, soda ash, caustic soda, and sulphuric acid.

* * *

The first plant to make sulphur from natural gas, the joint project of several oil companies, is expected to be completed and in operation in the Elk Basin oil fields of Wyoming next year. The plant, a conventional natural gasoline plant, will take natural gas from the field and extract its gasoline content. Gas from the Elk Basin field, however, contains almost 20 per cent hydrogen sulphide, which will also be produced. Upon completion, it is anticipated the plant will handle 12 million cu. ft. of natural gas daily, from which about 17,000 gallons of gasoline, 39,000 gallons of propane and butane and more than 70 long tons of sulphur will be obtained daily.

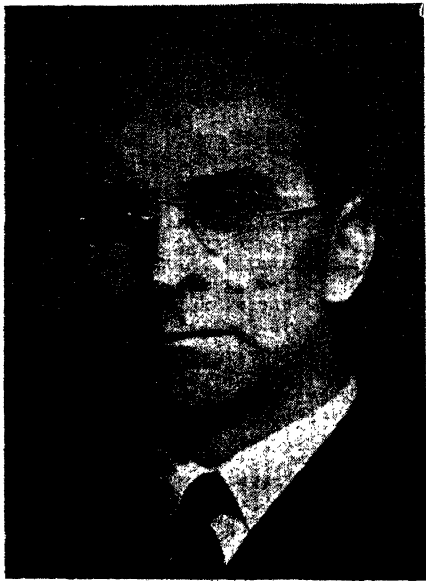
* * *

Marking its entry into the field of organosilicon chemicals, the Linde Air Products Co., a unit of the Union Carbide and Carbon Chemicals Corporation, is offering four compounds of the alkyltrichlorosilane and the alkyltriethoxysilane type in pilot plant quantities. As production facilities are expanded, officials said, additional organosilicons will be made available. Ethyl- and amyl-trichlorosilane, and ethyl- and amyl-triethoxysilane have currently been made available in quantities suitable for investigational and process-testing studies in the organosilicon field. It is believed that these materials will find many uses both in direct application and as "building blocks" in the production of intermediates, polymers and copolymers. Colourless liquids, with molecular weights ranging from 168 to 234, and soluble chemicals, these four silanes are expected to stimulate research in numerous fields.

Australian Distinction

Chemical Institute's Choice

SIR DAVID RIVETT, K.C.M.G., F.R.S., who, as announced in *THE CHEMICAL AGE* of July 24, accepted the presidency of the Society of Chemical Industry for 1948-49, has just been appointed president of the



Sir David Rivett

Australian Chemical Institute. He is chairman of the Commonwealth Council for Scientific and Industrial Research and a director of Imperial Chemical Industries of Australia and New Zealand. The works manager of I.C.I. Alkali (Australia) Pty., Ltd., of Oshorne, DR. R. R. GARRAN, has been elected to the Commonwealth CSIR.

JAPANESE IMPORTS CUT

STATISTICS released last week by the U.S. Department of Commerce indicate an upward trend in Japanese chemical production and marked reductions in Japanese imports of some chemical products. Production of ammonium sulphate in Japan during the first six months of 1948 totalled 451,637 metric tons and the monthly average was 75,272 tons, against 60,082 tons in 1947. Output of calcium cyanamide in the same half year was 90,769 tons and of superphosphate to 450,458 tons, a monthly average of 75,076 tons as compared with a monthly average of 59,078 tons the year before. Imports of phosphate rock, 296,945 tons compare with an average of 90,648 tons monthly in 1947.

Coconut Products

Heightened Activity in Ceylon

THE completion of an agreement for the shipment of copra and coconut oil between India and Ceylon, similar to the Ceylon-United Kingdom agreement has lately been sought by Mr. Dharma Vira, secretary to the Indian Cabinet, who has arrived in Ceylon. India needs about 44,000 tons of copra and oil annually. There is a shortage of coconut oil in India because the production of other oils has been stepped up. India still receives copra from the Philippines and Malaya, but the proposal now is to have a separate agreement with Ceylon.

Licences covering 11,850 tons of desiccated coconut for export out of a possible 13,600 tons have now been issued to exporters. Under the prevailing system the manufacture and export of desiccated coconut is subject to licence. Pre-war, the exports in the free market amounted to nearly 30,000 tons.

Changing Export Policy

That Ceylon should export as much as possible of her copra in the form of oil, so as to provide work for the oil mills in the Island as well as to promote local animal husbandry was urged by a deputation which met the Minister of Trade and Commerce, Mr. C. Suntherlingam. The Island's annual requirements of coconut poonac amount to nearly 40,000 tons, equivalent to 80,000 tons of oil. Under the copra agreement, Ceylon supplies to the United Kingdom 40,000 tons of coconut oil. If Pakistan cannot take delivery of her 8000 tons of oil, it will be sold on the basis of copra. This leaves a further 32,000 tons in terms of oil to be exported in the free market.

Ceylon fresh coconuts are at present fetching as much as Rs. 250 per 1000 nuts in the open market. The demand from the Middle East countries and India is so great that the record price level of Rs. 275 per 1000 which was touched in March-April this year, is expected to be equalled if not surpassed. Up to the end of August this year 5 million coconuts, valued at more than Rs. 1 million, have been sent out of the Island.

Japanese Physical and Chemical Research—Japan's Institute of Physical and Chemical Research has recently been dissolved and its work has been taken over by the Scientific Research Institute, Ltd., Komagome, Bunkyo-ku, Tokio. The organisation's two journals have been renamed as follows: the *Journal of the Scientific Research Institute* and the *Kagaku Kenkyujo Hokoku* (Reports of the Scientific Research Institute).

Personal

DR. ERNEST H. VOLWILER, executive vice president of Abbott Laboratories, North Chicago, Illinois, and leader in the field of medicinal chemistry has been chosen president-elect of the American Chemical Society, for 1949. Next year's president is PROF. LINUS PAULING, chairman of the division of chemistry and chemical engineering in the California Institute of Technology. Dr. Volwiler, who is 54, was elected in a national ballot of the 59,000 members of the society. He is well-known for his practical research, and his interest in the relationship between the chemical structure of compounds and their physiological activity resulted in the introduction of such drugs as butyn sulphate, a local anæsthetic; lutesin, an analgesic; and pentothal sodium, a barbiturate. In 1947 he received the Honour Scroll Award of the American Institute of Chemists.

MESSRS. G. J. COLE, W. A. FAURE, H. S. A. HARTOG, F. D. MORRELL and A. H. SMITH have been appointed members of the board of Lever Brothers & Unilever, Ltd. They will later be proposed as directors of Lever Brothers & Unilever N.V.

MAJOR GENERAL J. A. M. ROND has been appointed a director of the Pearson and Knowles Coal and Iron Company.

MR. GEORGE ARCHER and MR. J. K. BRINDLEY have been appointed directors of the Mond Nickel Company.

MR. F. A. SZARVASY, a director of Dunlop Rubber Co., Ltd., colliery and other companies, left £71,490 gross, with net personalty £43,065.

MR. GEORGE BENTFIELD CLEMONS, of Leeds, chairman and joint managing director of the Yorkshire Dyeware and Chemical Company, Ltd., left £59,360.

MR. H. J. PENN, a director of Murex, Ltd., has been appointed general manager of the Murex group of companies.

Obituary

SIR WILLIAM EDGE, Bt., formerly Liberal M.P. for Bolton, and for the Bosworth division of Leicester from 1927 to 1945, whose death is announced, at his home at Lytham St. Anne, Lancs., at the age of 68, was associated most of his life with the family dye manufacturing business—of which he later became the head—of William Edge & Sons, Ltd., Dolly Blue Works, Bolton.

MR. ROBERT WILLIAM MARTIN, founder and governing director of Bob Martin, Ltd., manufacturers of veterinary preparations, Southport, has died at the age of 81.

The death occurred last month in Montreal of MR. JOSEPH W. HOLMES, aged 63, sales manager of the explosives division of Canadian Industries, Ltd.



President-elect, American Chemical Society, and a leader in medicinal chemistry, Dr. E. H. Volwiler



Dr. Marjory Stephenson, pioneer in chemical micro-biology, whose death was announced in our last issue

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

JOHN BROWN & CO., LTD., Sheffield. (M., 25/12/48.) November 2, sub-mortgage supplemented to Trust Deed registered October 24, 1944; charged on properties comprised in a mortgage dated November 1, 1948., situate at Scunthorpe. *£476,168. July 12, 1948.

WELDING TOOL DEVELOPMENTS, LTD., Birmingham. (M., 25/12/48.) November 10, £3000 debenture to J. P. Hodgson, Liverpool, and another; general charge. *Nil. August 19, 1948.

Satisfactions

COPPERAD, LTD. (formerly BRITISH UNIT HEATER CO., LTD., TERRELL'S IRON STEEL & COAL CO., LTD., and TERRELL'S IRON & STEEL CO., LTD.), London, E.C. (M.S., 25/12/48.) Satisfaction November 15, of debenture registered May 27, 1947.

PEARSON & KNOWLES COAL & IRON CO., LTD., London, E.C. (M.S., 25/12/48.) Satisfaction November 15, of debenture stock registered February 10, 1922, March 25, 1927, and December 30, 1930, to the extent of £836,039.

PENDER PLATING, LTD., Poole. (M.S., 25/12/48.) Satisfaction November 11, of mortgage and charge registered August 14, 1947.

RENISHAW IRON CO., LTD. (M.S., 25/12/48.) Satisfaction November 17, of charge registered December 1, 1942.

Company News

At the 14th annual general meeting of **Glaxo Laboratories, Ltd.**, Sir Harry Jephcott (chairman and managing director), announced that the value of the company's export and overseas sales for the nine months ending June 1948 was twice that of the total sales—home and abroad—for 1938/9.

Powell Duffryn, Ltd. announces the following dividends (less tax): For the year ending March 31, 1949: ordinary stock 3 per cent on the £9,660,471 stock, payable on

February 23; for the half year to December 31: 4½ per cent cumulative preference stock, 2½ per cent on the £3,600,000 stock, payable January 22.

New Companies Registered

Dexters Paints (Manufacturing), Ltd. (461,959).—Private company. Capital £1000. Directors: C. Eatough, J. C. Eatough, H. C. Eatough. Reg. office: Albert Works, Trafalgar Street, Burnley.

L. B. Holliday (Holdings), Ltd. (461,572).—Private company. Capital £100. To acquire the issued share capital of L. B. Holliday & Co., Ltd., and to carry on the business of dye and chemical manufacturers, manufacturing chemists, etc. Reg. office: Leeds Road, Deighton, Huddersfield.

Industrial and Marine Protective Appliances, Ltd. (461,435).—Private company. Capital £1000. Suppliers of materials for the protection of metal, concrete, and wood against corrosion and chemical action. Directors: P. A. Chennell, G. T. Gitsham, G. R. Baker and P. E. Baker. Reg. office: 55 Bradley Lane, Bradley Fold, nr. Bolton.

Moldex (London), Ltd. (461,873).—Private company. Capital £1000. Manufacturers of materials and articles composed of latex, synthetic and/or natural rubber, etc. Directors: P. P. Forbes and F. E. Daniels. Reg. office: 156 Ballards Lane, Finchley, N.3.

Rea Manufacturing Co. (Birmingham), Ltd. (461,518).—Private company. Capital £1000. Manufacturers of chemicals, etc. Directors: H. K. Priestley and W. E. Stokes. Reg. office: Rea Works, 62 and 63 Bissell Street, Birmingham, 15.

Roli Manufacturing Co., Ltd. (461,404).—Private company. Capital £100. Manufacturers of fine chemicals, etc. Director: T. H. S. Ross. Reg. office: 112-114 Cannon Street, E.C.4.

Silicoils, Ltd. (461,455).—Private company. Capital £100. Technical and scientific research relating to media oils, greases, etc., in combination with organo silicates, silicones, etc. Directors: J. F. O'Brien, New Jersey; E. S. W. Biddlecombe. Reg. office: 85 Gracechurch Street, E.C.3.

Wallerstein & Co., Ltd. (461,365).—Private company. Capital £5000. Manufacturers of chemical preparations, etc. Directors: L. Wallerstein, J. Wallerstein, W. Graf and B. Stoller, all of 180 Madison Avenue, New York City; and A. T. Wheeler, 3 Torrington Court, S.E.26. Reg. office: Rex House, 38 King William Street, E.C.4.

Chemical and Allied Stocks and Shares

ALTHOUGH holiday influences are continuing to restrict Stock Exchange business, a firm undertone has been maintained and British Funds have again been higher on balance, although at the time of writing, best levels have not been held. Industrial shares have been attracting rather more attention because the small yields on gilt-edged stocks are tending to switch investment demand in other directions.

Financial results coming to hand continue to emphasise that companies prominent in both home and export markets are still doing well; but on the other hand, caution is the keynote and a large proportion of profits is being placed to reserves for specific purposes, notably to guard against any heavy fall in commodity prices or a reaction in the cost of materials. In many cases leading industrial companies are now carrying record stocks of materials; consequently any sharp fall in prices next year might mean big losses.

Turner & Newall is able to report bumper profits for the past financial year, and apart from £1 million placed to general reserve, another £1 million of the past year's profits goes to a special reserve against investments in overseas subsidiaries. Annual meeting of Tube Investments revealed that the group has cut prices of its products on a scale of £1 million annually in the national interest. This has stimulated demand and the company has benefited; but there is now another side to the picture, namely, the high cost of materials it now has to face and mounting expenses resulting from the cost of the National Health scheme, which are estimated to call for an additional £900,000 from the group this year.

Chemical and Kindred shares have been unaffected by the President of the Board of Trade's decision to institute a survey into the industry's position and outlook. This was not unexpected, although it has been suggested in the City that the survey might form a basis for nationalisation if after the next General Election another Labour Government were returned.

Imperial Chemical at 48s. 9d. have been in better demand, it being pointed out that the directors have expressed the view that there are reasonable prospects of the 10 per cent dividend being maintained on the larger capital in future. On this basis there is a not unattractive yield at the current price.

Turner & Newall at 80s. 4½d. have responded moderately to the record financial results for the past year. This is a case

where there would probably have been an increase in the dividend had it not been for the Government's dividend limitation request. Shareholders are again limited to 15 per cent, although actual earnings on the shares are very substantially above this rate.

Monsanto Chemical shares have remained firm at 62s. 6d., Albright & Wilson at 31s., and Amber Chemical 2s. shares at 9s. 3d., while Fisons were again 59s., and Laporte 4s. units at 21s. 6d. Dunlop Rubber after touching 76s. at the end of last week turned easier with the general trend of markets. A feature has been further demand for Glaxo Laboratories' 10s. shares, which at £21½ have risen by over £2. Demand is based on the view that this is a case where there is scope for a good dividend increase when Sir Stafford Cripps lifts his dividend limitation request.

Oil shares became more prominent, V.O.C. being raised sharply to nearly £7½ following the Shell offer to issue two Shell shares for every V.O.C. share. The Shell group already has a majority holding in V.O.C. Burmah Oil and Anglo-Iranian also moved in favour of holders, but oils generally failed to hold all earlier gains.

Aluminium Alloy Castings

In order to improve contacts with the industry, both in connection with sales and technical problems concerning aluminium alloy castings, Renfrew Foundries, Ltd., Glasgow, announces that, as from the beginning of next year, fully qualified sales engineers have been appointed as follows, to cover five areas in England, Scotland and Wales. Scotland: R. McGLASHAN, Hillingdon, Glasgow, S.W.2; Northern England: A. J. HADEN, Shipley, Yorkshire; Midlands and Wales: J. A. K. FERGIE, Adderbury, Banbury, Oxfordshire; North London and Eastern Counties: E. P. MENDOZA, Edgware, Middlesex; South London and Southern England: J. S. THOMPSON, Uxbridge, Middlesex.

New Austrian Chemical Company.—A new chemical company, the Steirische Chemie Aktiengesellschaft, Kapfenberg, has recently been registered in Leoben, Styria, Austria. A substantial part of the initial capital of six million schillings is controlled by the Austrian Credit Institute. The company is to produce hardening powders for the metallurgical industry as well as carbon sulphide to be supplied to the Lenzing staple fibre plant, the St. Pölten rayon works, and to agricultural co-operatives. It is proposed to cover Austria's whole carbon sulphide requirements, thus dispensing with imports from Switzerland and Czechoslovakia.

Prices of British Chemical Products

THERE have been no outstanding features in the various sections of the industrial chemicals market nor have there been price changes of any importance. Most reports indicate active conditions, with the leading home consuming industries again calling for deliveries up to the full extent of contract commitments. Added to this, buying for shipment remains persistent and export figures are expected to show an increase despite competition in overseas markets. The coal tar products market is steady with an average business being put through. Supplies in this section are easier with quotations unchanged.

MANCHESTER.—Deliveries of the alkali products and other heavy chemicals to domestic users in Lancashire and the West Riding of Yorkshire, especially to the textile and allied industries, have continued on a steady scale against existing contracts during the past week, although so far as volume of inquiry and actual new business is concerned there have been indications of the usual seasonal falling off. This may be expected to continue until after the turn

of the year. The outlook for 1949, however, is regarded as promising both for home and export business and a return of buying interest to its recent level is anticipated. The market as a whole continues on a firm basis and future price changes seem more likely to be up than down.

GLASGOW.—There has been no change of note in conditions prevailing in the Scottish chemical market during the past week. Prices for prompt delivery have remained constant, although some price alterations in deliveries in the New Year have been advised. So far, no general increase in prices has been made known and in some cases small decreases are expected to occur. The supply position has remained unchanged and turnover has in general been on a slightly reduced scale, as expected.

Price Changes

Rises: Cobalt oxide, litharge, zinc oxide, naphtha.

Reductions: Lactic acid, sodium metaphosphate.

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton, £64; 80% pure, 1 ton, £66; commercial glacial 1 ton £79; delivered buyers' premises in returnable barrels: £4 10s. per ton extra if packed and delivered in glass.

Acetic Anhydride.—Ton lots, d/d, 11½d. per lb.

Acetone.—Maximum prices per ton, 1½ tons, £76 10s.; single drums, £77 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alcohol, Industrial Absolute.—50,000 gal. lots, d/d, 2s. 7½d. per proof gallon; 5000 gal. lots, d/d, 2s. 10½d. per proof gal.

Alum.—Loose lump, £17 per ton, f.o.r. MANCHESTER: £16 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER: £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 8d. per lb.

Ammonium Bicarbonate.—MANCHESTER: £48 per ton d/d.

Ammonium Carbonate.—£48 per ton d/d in 5-cwt. casks. MANCHESTER: Powder, £50 d/d.

Ammonium Chloride.—Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £21 to £25 per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate.—MANCHESTER: £5 per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £78 and £76 10s. per ton.

Antimony Oxide.—£162 10s. per ton.

Antimony Sulphide.—Golden, d/d, as to quantity, etc., 4s. to 5s. per lb.

Arsenic.—Per ton, £40 5s. to £41 5s., according to quality, ex store.

Barium Carbonate.—Precip., d/d; 2-ton lots, £25 15s. per ton, bag packing, ex works.

Barium Chloride.—Currently imported at fluctuating rates.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £26 10s. per ton d/d; 2-ton lots, £26 15s. per ton.

Bleaching Powder.—Spot, 35/37%, £11 10s. per ton in casks.

Borax.—Per ton for ton lots, in free 1-cwt. bags, carriage paid: Commercial, granulated, £30; crystals, £31; powdered, £31 10s.; extra fine powder, £32 10s. B.P., crystals, £39; powdered, £39 10s.; extra fine, £40 10s. Borax glass, per

ton in free 1-cwt.-waterproof paper-lined bags, for home trade only, carriage paid: lump, £77; powdered, £78.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granulated, £52; crystals, £53; powdered, £54; extra fine powder, £56. B.P., crystals, £61; powder, £62; extra fine, £64.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £3 12s. 6d. per ton, in 4 ton lots.

Charcoal, Lump.—£25 per ton, ex wharf. Granulated, £30 per ton.

Chlorine, Liquid.—£29 per ton, d/d in 16/17-cwt. drums (3-drum lots).

Chrometan.—Crystals, 5½d. per lb.

Chromic Acid.—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

Citric Acid.—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6½d., other, 1s. 5.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

Cobalt Oxide.—Black, delivered, 7s. 7d. per lb.

Copper Carbonate.—MANCHESTER: 1s. 7½d. per lb.

Copper Chloride.—(53 per cent), d/d, 1s. 10½d. per lb.

Copper Oxide.—Black, powdered, about 1s. 4½d. per lb.

Copper Nitrate.—(53 per cent), d/d, 1s. 8½d. per lb.

Copper Sulphate.—£42 10s. per ton f.o.b., less 2%, in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., from 157s. per 1-2 cwt. lot, d/d.

Ethyl Acetate.—10 tons and upwards, d/d, £115 per ton.

Formaldehyde.—£31 per ton in casks, according to quantity, d/d. MANCHESTER: £32.

Formic Acid.—85%, £64 per ton for ton lots, carriage paid. 90%, £67 5s. per ton.

Glycerine.—Chemically pure; double distilled 1260 s.g., 123/1 per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 7s. 6d. to 8s. 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—1s. 0½d. per lb. d/d, carboys extra and returnable.

Iodine.—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.

Iron Sulphate.—F.o.r. works, £3 15s. to £4 per ton.

Lactic Acid.—Pale, tech., £70 per ton; dark tech., £60 per ton ex works; barrels returnable.

Lead Acetate.—White, 125s. to 130s. per cwt., according to quantity.

Lead Carbonate.—British dry, ton lots, d/d, £116 10s. per ton.

Lead Nitrate.—About £125 per ton d/d in casks. MANCHESTER: £125.

Lead, Red.—Basic prices per ton: Genuine dry red lead, £127; orange lead, £131. Ground in oil: red, £149 10s., orange, £161 10s. Ready-mixed lead paint: red, £154; orange, £169 10s. (subject to increase of £1 10s. per ton).

Lead, White.—Dry English, in 8-cwt. casks, £136 per ton. Ground in oil, English, in 5-cwt. casks, £157 10s. per ton.

Lime Acetate.—Brown, ton lots, d/d, £18 to £20 per ton; grey, 80-82 per cent, ton lots, d/d, £22 to £25 per ton.

Litharge.—£124 10s. to £127 per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £18 5s.

Magnesium Carbonate.—Light, commercial, d/d, £70 per ton.

Magnesium Chloride.—Solid (ex wharf), £27 10s. per ton.

Magnesium Oxide.—Light, commercial, d/d, £160 per ton.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., for 2-cwt. lots, 7s. 6d.; smaller quantities dearer.

Mercurous Chloride.—8s. to 9s. per lb., according to quantity.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° O.P. 100 gal., 4s. 10d. per gal.; pyridinised 64° O.P. 100 gal., 4s. 11d. per gal.

Nickel Sulphate.—F.o.r. works, 3s. 4d. per lb.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—£128 to £133 per ton packed in free 5-cwt. casks.

Paraffin Wax.—Nominal.

Phosphoric Acid.—Technical (S.G. 1.500), ton lots, carriage paid, £61 per ton; B.P. (S.G.1.750), ton lots, carriage paid, 1s. 1d. per lb.

Phosphorus.—Red, 3s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.

Potash, Caustic.—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate.—Crystals and granular, 9½d. per lb.; ground, 10½d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £64 per ton for 1-ton lots, ex store; hydrated, £58 for 1-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Chloride.—Industrial, 96 per cent, 6-ton lots, £16.10 per ton.

Potassium Iodide.—B.P., 8s. 8d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 8½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 8d. per lb.; technical, £7 14s. 3d. to £8 6s. 3d. per cwt., according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £21 to £25 per ton, in casks, ex store.

Salicylic Acid.—MANCHESTER: 1s. 11d. to 3s. 1d. per lb. d/d.

Soda Ash.—58° ex depôt or d/d, Lohdon station, £7 12s. 6d. to £8 7s. 6d. per ton.

Soda, Caustic.—Solid 76/77%; spot, £18 4s. per ton d/d.

Sodium Acetate.—£60-£75 per ton.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 8d. per lb.; anhydrous, 7½d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite.—Powder, 60/62%, £28 7s. 6d. per ton d/d in 2 ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£45 to £47 per ton.

Sodium Cyanide.—100 per cent basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite.—Pea crystals 22s. 6d. per cwt. (2-ton lots); commercial, 1-ton lots, £16 per ton carriage paid. Packing free.

Sodium Iodide.—B.P., 10s. 2d. per lb. to 12s. 1d. according to quantity.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £108 ton.

Sodium Metasilicate.—£19 5s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98 per cent, 6-ton lots, d/d station, £19 15s. per ton.

Sodium Nitrite.—£28-29 per ton.

Sodium Percarbonate.—12½% available oxygen, £7 per cwt. in 1-cwt. drums.

Sodium Phosphate.—Di-sodium, £32 10s. per ton d/d for ton lots. Tri-sodium, £62 per ton d/d for ton lots.

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Silicofluoride.—Ex store, nominal.

Sodium Sulphate (Glauber Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground, £6 per ton d/d station in bulk. MANCHESTER: £6 5s. per ton d/d station.

Sodium Sulphide.—Solid, 60/62%, spot, £23 per ton, d/d, in drums; broken, £23 15s. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £14 12s. 6d. to £16 17s. 6d., according to fineness.

Sulphuric Acid.—168° Tw., £6 to £7 per ton; 140° Tw., arsenic free £4 5s. to £5 5s. per ton; 140° Tw., arsenious, £4 15s. per ton. Quotations naked at sellers' works.

Tin Oxide.—1-cwt. lots d/d £25 10s.

Titanium Oxide.—Comm., ton lots, d/d, (56 lb. bags), £97 per ton.

Zinc Oxide.—Maximum prices per ton for 2-ton lots, d/d; white seal, £101 15s.; green seal, £100 15s.; red seal, £99 5s.

Zinc Sulphate.—No quotation.

Rubber Chemicals

Antimony Sulphide.—Golden, 3s. to 4s. per lb. Crimson, 2s. 7½d. to 3s. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb. Barytes.—Best white bleached, £8 3s. 6d. per ton.

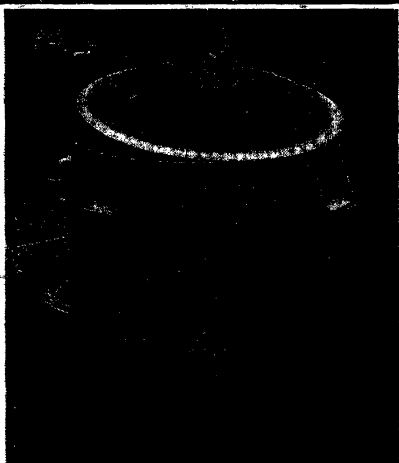
Cadmium Sulphide.—6s. to 6s. 6d. per lb.

FOR SPECIALISED CASTINGS



The photograph reproduced on the right shows a cast-iron caustic pot and cover for shipment to Sweden. Dimensions: Pot, 7 ft. 10½ in. inside diameter by 9 ft. 1½ in. overall depth; weight, 9½ tons; cover, 7 ft. 10½ in. diameter, weight, 23 cwt.

High standards, backed up by close supervision over all materials and workmanship assure the unvarying good quality of Widnes castings. Widnes Foundry have the facilities, the men and the experience to produce the most intricate and accurate special-purpose castings and this combination is at your service from the moment you get in touch.



★ WIDNES FOUNDRY are specialists

in the production of cast and fabricated vessels and equipment in cast irons, mild and stainless steels for the **CHEMICAL, OIL, FOOD and ALLIED INDUSTRIES.**

WIDNES

FOUNDRY & ENGINEERING

TELEPHONE WIDNES 2201 (4 LINES) **CO. LTD** TELEGRAMS 'FOUNDRY' WIDNES

LUGSBLE ROAD · WIDNES · LANC.

London Office: **BRETENHAM HOUSE, LANCASTER PLACE, STRAND, W.C.2.**

Carbon Bisulphide.—£37 to £41 per ton, according to quality, in free returnable drums.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£56 to £59 per ton, according to quantity.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 10 5/16d. to 1s. 5½d. per lb.; dark, 10½d. to 1s. per lb.

Lithopone.—30%, £33 12s. 6d. per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermillion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Phosphate.—Not quoted—temporarily unobtainable.

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, in January, £10 5s., rising by 1s. 6d. per ton per month to March, 1948.

Calcium Cyanamide.—Nominal; supplies very scanty.

Concentrated Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. No. 1 grade, where available, £14 18s. 6d.

"Nitro-Chalk."—£10 4s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £17 5s. per ton; granulated, over 98%, £16 per ton.

Coal-Tar Products

Benzol.—Per gal. ex works: 90's, 2s. 6d.; pure, 2s. 8½d.; nitration grade, 2s. 10½d.

Carbolic Acid.—Crystals, 11½d. per lb. Crude, 60's, 3s. 6d. to 4s. 3d. MANCHESTER: Crystals, 10½d. to 1s. 0½d. per lb. d/d; crude, 4s. 3d., naked, at works.

Creosote.—Home trade, 6½d. to 9½d. per gal., according to quality, f.o.r. maker's works. MANCHESTER: 6½d. to 9½d. per gal.

Cresylic Acid.—Pale, 97%, 3s. 6d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 4d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, 4s. 4d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 11d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 4d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Naphthalene.—Crude, ton lots, in sellers' bags, £8 1s. to £12 13s. per ton according to m.p.; hot-pressed, £14 15s. to £15 14s. per ton, in bulk ex works; purified crystals, £28 to £43 5s. per ton. Controlled prices.

Pitch.—Medium, soft, home trade, 100s. per ton f.o.r. suppliers' works; export trade, £8 5s. to £9 5s. per ton f.o.b. suppliers' port. MANCHESTER: 100s. f.o.r.

Pyridine.—90/140°, 18s. per gal.; 90/160°, 14s. MANCHESTER: 17s. 6d. to 21s. per gal.

Toluol.—Pure, 3s. 2½d. per gal.; 90's, 2s. 4d. per gal. MANCHESTER: Pure, 3s. 2½d. per gal. naked.

Xylol.—For 1000-gal. lots, 3s. 3½d. to 3s. 6d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £15 per ton; grey, £22.

Methyl Acetone.—40/50%, £56 to £60 per ton.

Wood Creosote.—Unrefined, from 3s. 6d. per gal., according to boiling range.

Wood Naphtha.—Miscible, 4s. 6d. to 5s. 6d. per gal.; solvent, 5s. 6d. to 6s. 6d. per gal.

Wood Tar.—£6 to £10 per ton.

Intermediates and Dyes (Prices Nominal)

m-Cresol 98/100%.—Nominal.

o-Cresol 30/31° C.—Nominal.

p-Cresol 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.

p-Nitraniline.—2s. 5d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—1s. 2d. per lb.; P.G. 1s. 0½d. per lb.

o-Toluidine.—1s. per lb., in 8/10-cwt. drums, drums extra.

p-Toluidine.—2s. 2d. per lb., in casks.

m-Xyldine Acetate.—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—December 21.—The prices of LINSEED, RAPESEED, COCONUT, PALM KERNEL, GROUNDNUT and WHALE OILS, as well as ACID OILS, remain the same (THE CHEMICAL AGE, October 30). These prices continue for periods ending January 1, 1949, in respect of crude oils, and January 29, 1949, for refined oils. ROSIN and TURPENTINE prices remain the same, according to grade.

